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FOREWORD

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HEALTH BEHAVIORS AND PERFORMANCE OF MILITARY WOMEN

YEAR 3 ANNUAL REPORT

INTRODUCTION

The shift in the U.S. Military from a conscription-based to an all-volunteer force in 1973, along with increased acceptance of women's involvement in traditionally male-dominated occupations, has created new opportunities for an increasing number of women in the Military. In the early 1980s, fewer than 10% of the armed forces were women, but by 1995, the percentage had increased to about 14%.¹ The increasing involvement of women in the Military and changes in the nature of that involvement have raised questions about military women's health, safety, and well-being, as well as the implications of these issues for overall military readiness.

Although the percentage of women in the Military has increased, relatively little is known about their health, performance, and special needs. Prior research on military personnel has largely involved male-only samples, and analyses of studies of the total military population have generally concentrated on military men or the overall military population.

The major objectives of the research being examined as part of this grant are to:

- examine the health of military women in terms of health status, health practices, and health care utilization;
- assess work-related performance of military women; and
- examine relationships between health and performance of military women.

This research draws on data for military women and men from the series of Worldwide Surveys of Substance Abuse and Health Behaviors Among Military Personnel sponsored by the Department of Defense. The series includes six surveys conducted in 1980, 1982, 1985, 1988, 1992, and 1995;²⁻⁷ a seventh survey is currently underway for 1998. All of these surveys used statistical probability designs that yielded large sample sizes (from 15,000 to 22,000 respondents) and reasonably high response rates (from 70% to 84%). Consequently, their data provide unbiased estimates of population parameters and permit inferences about the characteristics and behaviors of active-duty military personnel. For Year 3 of the grant, most analyses were based on data from the 1995 Worldwide Survey, although data also were analyzed from the earlier surveys to examine trends in health and performance. Comparisons were made between military women and men and among subgroups of military women.

BODY

During Year 3 of the grant, analyses were conducted that supported the preparation of three papers. Three presentations given at the 1997 American Public Health Association Annual Meeting also were supported by this grant. Each of the papers and presentations addresses an aspect of the health and performance of military women consistent with the objectives of the grant. Both descriptive cross-tabulations and multivariate logistic regression analyses were conducted. Copies of each of the papers and slides from the conference presentations are appended to this report. Key findings from the papers and presentations are noted below. Additional papers are in progress and will be completed during the coming year.

Completed Papers

1. "Stress and Substance Use Among Military Women and Men." Robert M. Bray, John A. Fairbank, and Mary Ellen Marsden. In Press, The American Journal of Drug and Alcohol Abuse.

Portions of this paper appeared in an earlier form in F.H. Gabbay, R.J. Ursano, A.E. Norwood, C.S. Fullerton, and C.C. Duncan (Eds.), Sex Differences, Stress, and Military Readiness (Vol. II), published by the Uniformed Services University of the Health Sciences, Department of Psychiatry, Bethesda, Maryland. This paper examines levels of stress, sources of stress, behaviors for coping with stress, and the relationship between stress and substance use for military women and men. Several findings were considered to be important:

- There was substantial alcohol and cigarette use, but rates of illicit drug use were lower among military women and men. Military men (19%) were over three times more likely than military women (5%) to drink heavily. About 1 in 5 men but only 1 in 20 women was likely to be a heavy drinker. The rate of cigarette smoking was 26% among military women and 33% among men. Roughly 1 out of 4 women and 1 out of 3 men were current smokers. The prevalence of illicit drug use showed similar rates among military women (5%) and men (7%), about 1 in 20 for both.
- About 40% of military women and men reported stress at work, more than in the family or personal relationships. About one-third of military women reported that they experienced high levels of stress from being a woman in the Military. The most frequently mentioned source of stress among military women was being away from family. Most military personnel used problem-focused or approach-oriented coping strategies for dealing with stress.

- Stress at work or in the family was an important predictor of substance use among military men but not among military women. Among military women, stress associated with being a woman in the Military was predictive of illicit drug use and cigarette use.

Findings suggest that more effective stress management strategies may need to be implemented for Military men to reduce the link between stress and heavy alcohol use, illicit drug use, and smoking.

2. "Does Stress Differentially Affect the Work Performance of Military Women and Men? Findings from a Worldwide Survey of U.S. Military Personnel." Carol S. Camlin, Robert M. Bray, John A. Fairbank, Sara C. Wheelless, and George H. Duntelman. Draft paper to be submitted for publication.

This study examined the relationships between several domains of stress and level of work performance among women and men in the U.S. armed forces. It also examined the association of coping style, substance use, and symptoms of depression with level of work performance for military women and men. Multivariate cumulative logistic regression analyses examined data from the 1995 DoD Worldwide Survey of Health Related Behaviors Among Military Personnel. The survey included a representative sample of 16,193 active-duty personnel serving in all branches of the armed forces throughout the world. Key findings from the paper include the following:

- For both women and men, higher levels of work-related stress, health-related stress, and symptoms of depression significantly increased the odds of a lower level of job-functioning.
- For men only, higher levels of family stress, use of a negative coping style, illicit drug use, and being a heavy drinker increased the odds of lower job functioning.
- In general, the effects of stress and depression on job functioning were quite similar for military women and men.

Findings suggest that it may be useful for military health providers to focus on interventions to identify, prevent, and provide care for stress-related problems and symptoms of depression for military personnel, in that these problems affect military men and women's ability to function well on the job.

3. "Deployment and Substance Use Among Military Women and Men." E. Belle Federman, Robert M. Bray, and Larry A. Kroutil. Submitted to Military Psychology.

Prior research has indicated that rates of substance use by military personnel may increase or decrease during combat situations compared to use prior to deployment. Changes during deployed situations in the access to substances, stress, daily routines, and normative attitudes about substance use have all been implicated in the observed differences in substance use. Despite these advances, little is known about the relative proclivity of individuals to engage in substance use during deployment beyond the specific situation of combat. In addition, even less is known about substance use among deployed military women. This paper examines the relationship between substance use and deployment among military women and men using data from the 1995 DoD Worldwide Survey. Several key findings from the paper are summarized below.

- Descriptive analyses showed that deployed women had significantly higher rates of heavy alcohol use and alcohol dependence than did nondeployed women, but the groups showed no differences for cigarette use or illicit drug use. Rates of heavy alcohol use were almost three times higher among deployed military women compared to those not deployed (12.3% vs. 4.3%).
- Deployed men showed significantly higher rates of smoking (38.7% vs 30.0%), heavy alcohol use (24.0% vs. 16.7%), alcohol dependence (9.3% vs. 4.9%), and illicit drug use (4.4% vs. 2.5%) than did nondeployed men.
- Rates of nonheavy alcohol use were between 61.4% and 63.6% across women and men in both the deployed and nondeployed groups. However, for both women and men, a smaller percentage of deployed personnel reported abstaining from alcohol (25.8% vs. 32.2% for women and 14.6% vs. 21.6% for men). The consistency of rates of nonheavy alcohol use suggests that differences are likely to be the result of some abstainers initiating use of alcohol during deployments at moderate levels and a proportion of moderate drinkers starting to drink heavily.
- In general, logistic and multinomial logit regression analyses which controlled for age, race/ethnicity, education, marital status, branch of service, and pay grade paralleled the bivariate findings. Among women, there was a strong relationship between deployment and heavy alcohol use. The odds of heavy alcohol use were 2.84 times higher among deployed women than among those not deployed.
- Among men, once demographic factors were controlled, deployment still showed a positive significant association with cigarette use, alcohol use, and alcohol dependence, but not with illicit drug use. The odds of engaging in the first three behaviors ranged from 1.30 to 1.51 times higher among deployed men than among nondeployed men.

- Additional analyses suggested that the relationship between deployment and substance use was even stronger when stress due to deployment was taken into account. However, for both women and men, deployment even in the absence of stress, remained significantly related to heavy alcohol use.

Findings from this paper provide evidence that substance use may be higher among those deployed, even when deployment does not involve direct combat. More research is needed to understand whether increases in substance use subside after personnel return from deployment and also to understand causal factors for increases in use.

Conference Presentations

1. "Substance Use and Injury Among Military Women and Men." Mary Ellen Marsden, Robert M. Bray, Larry A. Kroutil. Paper presented at the 125th Annual Meeting of the American Public Health Association, at Indianapolis, Indiana, November 13, 1997.

Several significant findings were presented:

- Military rates of hospitalization for injury and work-related injuries are higher than corresponding rates in the civilian population.
- Military rates of hospitalization for injury and work-related injuries are highest among younger persons, less well educated, enlisted personnel, and substance users.
- Illicit drug use and heavy alcohol use are associated with high rates of hospitalization for injury and work-related injury for military men and women.

2. "Co-Occurrence of Substance Use and Other Health-Risk Behaviors Among Military Women and Men." Robert M. Bray, Larry A. Kroutil, and Mary Ellen Marsden. Paper presented at the 125th Annual Meeting of the American Public Health Association, at Indianapolis, Indiana, November 13, 1997.

Several significant findings were presented:

- Military women and men showed a strong relationship between substance use and other health-risk behaviors of getting into fights, having multiple sexual partners, and using seat belts inconsistently.
- There was a consistent pattern of results, though some were not significant, showing that those who drank greater amounts of alcohol, used illicit drugs, and were heavy smokers were more likely than their counterparts to have more fights, to have more sexual partners, and to use seat belts inconsistently.
- For military women, the risk of more fights and a greater number of sexual partners increased with any use of alcohol, whereas for military men risk increased only for moderate or greater use.
- Inconsistent seat belt use was not significantly associated with alcohol use or illicit drug use for military women, though it was for men.

3. "Does Stress Differentially Affect the Work Performance of Military Women and Men? Findings from a Worldwide Survey of U.S. Military Personnel." Carol S. Camlin, Robert M. Bray, John A. Fairbank, Sara C. Wheeless, and George H. Dunteman. Paper presented at the 125th Annual Meeting of the American Public Health Association, at Indianapolis, Indiana, November 13, 1997. Draft paper to be submitted for publication.

Several significant findings were presented:

- Work and health-related stressors and depression increase the odds of a lower level of functioning at work for women and men.
- For men, work-related stress, health-related stress, financial stress, heavy drinking, illicit drug use and negative coping style increase the odds of lower level functioning at work. This finding is in contrast to the factors of lower level functioning at work for women, which, for women, were work-related stress, health-related stress, and symptoms of depression.
- Overall impact of work-related stress maybe somewhat greater for women ,if work-related stress is associated with lower job functioning, and if women report a greater level of stress at work.

4. "Deployment and Substance Abuse Among Military Men and Women." Larry A. Kroutil, E. Belle Federman, and Robert M. Bray. Paper presented at the 125th Annual Meeting of the American Public Health Association, at Indianapolis, Indiana, November 13 1997.

Several significant findings were presented:

- Deployment was associated with cigarette use among men but not among women.
- Deployment was strongly associated with heavy alcohol use but not with moderate use in women; and deployment was associated with both moderate and heavy alcohol use in men.
- No association between deployment and illicit drug use was found for either women or men.

Plans for the Coming Year

During the final year of this grant, we will continue to work on manuscripts that are in progress and plan additional analyses for new papers. At this time we anticipate that several

papers will be completed and submitted for journal publication. We have identified the following tentative titles for papers that we expect to submit during the remainder of the grant period:

- Trends in Substance Abuse Among Military Personnel and Civilians (1980-1995)
- Substance Use Among Military Women and Men
- Health and Health Care Utilization Among Military Women and Men
- The Co-Occurrence of Substance Use and Other Health Risk Behaviors Among Military Women and Men
- Substance Use and Injury Among Military Women and Men

CONCLUSIONS

Findings from the analyses conducted during Year 3 of this grant show new and important relationships between substance use and stress, between coping style and stress, substance use and deployment, and key differences between women and men in health status. Military women and men have both shown significant reductions in alcohol use, illicit drug use and cigarette use between 1980 and 1995. Illicit drug use has declined to low levels, but rates of heavy alcohol use, particularly for men, and smoking both for women and men are still cause for concern. Many women and men report high levels of stress at work and women report stress associated with being a woman in the Military. Stress at work or in the family is related to substance use for men, but only stress due to being a woman in the Military is associated with substance use for women.

Higher prevalence rates of cigarette, alcohol, and illicit drug use during deployment among both military women and men compared to their nondeployed counterparts have implications for overall readiness during critical times. Attention should be given to promoting healthier coping strategies among personnel facing the unique stressors of deployment.

REFERENCES

1. Institute of Medicine: Recommendations for Research on the Health of Military Women (U.S. Army Medical Research and Materiel Command Contract No. DAMD17-95-1-5024). Washington, DC, National Academy Press, 1995.
2. Burt MA, Biegel MM, Carnes Y, Farley EC: Worldwide Survey of Non-Medical Drug Use and Alcohol Use Among Military Personnel: 1980. Bethesda, MD, Burt Associates, Inc., 1980.
3. Bray RM, Guess LL, Mason RE, Hubbard RL, Smith DG, Marsden ME, Rachal JV: 1982 Worldwide Survey of Alcohol and Non-medical Drug Use Among Military Personnel (RTI/2317/01-01F). Research Triangle Park, NC, Research Triangle Institute, 1983.
4. Bray RM, Marsden ME, Guess LL, Wheelless SC, Pate DK, Duntelman GH, Iannacchione VG: 1985 Worldwide Survey of Alcohol and Nonmedical Drug Use Among Military Personnel. Research Triangle Park, NC, Research Triangle Institute, 1986.
5. Bray RM, Marsden ME, Guess LL, Wheelless SC, Iannacchione VG, Keesling SR: 1988 Worldwide Survey of Substance Abuse and Health Behaviors Among Military Personnel. Research Triangle Park, NC, Research Triangle Institute, 1988.
6. Bray RM, Kroutil LA, Luckey JW, Wheelless SC, Iannacchione VG, Anderson DW, Marsden ME, Duntelman G: 1992 Worldwide Survey of Substance and Health Behaviors Among Military Personnel (Department of Defense Contract MDA903-91-C-0220). Research Triangle Park, NC, Research Triangle Institute, 1992.
7. Bray RM, Kroutil LA, Wheelless SC, Marsden ME, Bailey SL, Fairbank JA, Harford TC: 1995 Department of Defense Survey of Health Related Behaviors Among Military Personnel (Department of Defense Contract DASWO1-94-C-0140). Research Triangle Park, NC, Research Triangle Institute, 1995.

APPENDIX A

COMPLETED PAPERS

Stress and Substance Use Among

Military Women and Men

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and

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In press, The American Journal of Drug and Alcohol Abuse

Abstract

This paper examines the relationship between perceived stress (at work, in family or personal life, and from being a woman in the Military) and substance use (heavy drinking, illicit drug use, cigarette smoking) among active-duty military women and men. Data were drawn from over 16,000 respondents to the 1995 Department of Defense Survey of Health Related Behaviors Among Military Personnel.

Findings indicated substantial substance use and perceived high stress in the Armed Forces, and that the relation between substance use and stress varies by gender. Military women reported substantially lower rates of heavy drinking than men, but similar rates of illicit drug use and cigarette smoking. Both military women and men were more likely to describe their military duties as more stressful than their family or personal lives; for women, the stress associated with being a woman in the Military was second to stress at work. Stress at work or in the family was an important predictor of substance use among military men, but not among military women. For military women, stress associated with being a woman in the Military was predictive of illicit drug use and cigarette use. These findings suggest that more effective stress management strategies may need to be implemented for Military men to reduce the link between stress and heavy alcohol use, illicit drug use, and smoking.

Military women and men may be subject to a wide range of stressors as part of their military work assignments and duties. Such stressors may be associated with the physical or mental challenges of their jobs, demands placed on them because of a shortage of other personnel, exposure to trauma associated with combat, or conflicts between military and family responsibilities. In addition, military women may experience stress associated with being a woman in a predominantly male environment or because of sexual harassment they may encounter. Military personnel are also likely to experience the same stressors as other people outside the Military, including the press of family and work responsibilities and uncertainties introduced by changing economic conditions.

Psychosocial theories of stress generally recognize the importance of cognitive factors in the development and maintenance of stress-related symptoms and problems in life functioning. Folkman and Lazarus (1, 2), for example, proposed a psychosocial model that emphasizes the important role that cognitive appraisal plays in the development and maintenance of stress-related adjustment problems. Indeed, a number of experimental and applied studies have shown robust relationships between individuals' appraisal of the level of stress associated with specific life events, chronic stressors, and their capacity to function effectively (cf., 3).

Several decades of research also point to the multidimensional nature of reactions to stress, and that such reactions may vary by gender (e.g., 4). Numerous studies have reported strong relationships between stress, alcohol consumption, and emotional problems, with particularly robust connections between stressful life events and depression for women (5) and stress and alcohol abuse for men (4, 6, 7).

Another characteristic of research to date is that findings on the relationship of stress to substance use and emotional problems vary from study to study. Gorman (7) noted that certain features of occupational environments serve as stressors that increase the risk for alcohol abuse among both men and women. Indeed, a number of studies have found elevated rates of alcohol consumption among those with elevated levels of occupational stress, particularly among men (4). Other studies have found increased rates of cigarette smoking and coffee drinking as a response to high stress, but no relationship between

high stress and alcohol consumption (8). Similarly, in some studies of women, alcohol use has not been elevated, but psychotropic medication (e.g., tranquilizers) has been (9, 10). Further, some studies have found that respondents actually reduced their alcohol use during stressful periods (11).

Discrepancies between study findings may reflect meaningful differences in research methods, predisposing characteristics of study populations, and the type and severity of the stressor under study. In addition, other factors may influence the relationship between stress and substance abuse, such as respondents' sociodemographic characteristics and coping styles. For example, research has shown that stressors are highly predictive of drinking problems among men who rely on avoidance coping strategies (12). Women who rely on problem-focused strategies drink less during high-stress weeks than do women who score low on problem-focused coping (11).

Exposure to traumatic stressors has been strongly implicated in the elevated rates of substance abuse and dependence among veterans (13), and substance abuse has been found to be highly comorbid with post-traumatic stress disorder (14). Women who served in Vietnam and experienced high levels of war zone stress were found to have significantly higher rates of alcohol abuse and dependence than did other women veterans of the Vietnam era, while women theater veterans who were exposed to lower levels of such stress did not have significantly more alcohol disorders than did other women veterans of the Vietnam era (14).

Although these studies indicate a relationship between stress and substance use, the extent of the generalizability of their findings to today's active-duty Military is unknown. This paper builds on these prior studies and extends them by examining the relationship between stress and substance use among military personnel under noncombat, peacetime conditions among the current active force. Whereas most prior studies have focused on alcohol, the present study examines the relationship of stress and heavy drinking, any illicit drug use, and cigarette smoking. Following the Vietnam War, in response to concerns over drug use among Vietnam era veterans and other problems (e.g., the drug-related crash on the Nimitz), the Military established a policy of zero tolerance toward illicit drug use (15). Military policy expressly

forbids illicit drug use, and those who are determined to have engaged in drug use are excluded from Military service. Regulations are particularly strict for officers. Although the Military does not forbid alcohol use and smoking, it does seek to limit alcohol misuse that affects work performance and safety and discourages smoking (15 - 19).

Data for the present study were drawn from the 1995 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel (20), the most recent in a series of surveys conducted worldwide since 1980 to examine substance use and health behaviors among military personnel (21 - 28).

Methods

Sampling Design and Data Collection

The sample was selected using a deeply stratified, two-stage, two-phase probability design. The eligible survey population consisted of all active-duty military personnel except recruits, Service academy students, persons absent without official leave (AWOL), and persons who had a permanent change of station (PCS) at the time of data collection. The first stage of sampling involved selection of major military installations stratified by Service (Army, Navy, Marine Corps, Air Force) and world region (within the continental United States [CONUS], and outside CONUS [OCONUS]). Within the selected installations, the second stage of sampling involved selection of military personnel stratified by military pay grade, including three enlisted pay grade strata (E1-E3, E4-E6, E7-E9) and three officer pay grade strata (warrant officers in grades W1-W5 and commissioned officers in grades O1-O3 and O4-O10). The sample was selected to be representative of the active-duty force worldwide. Officers and women were oversampled because of their smaller numbers.

During data collection, respondents anonymously completed self-administered questionnaires that took about 55 minutes on average to answer and included a broad range of questions dealing with health-related behaviors, including items on substance use and stress. Most respondents (88%) attended group sessions at 59 installations where questionnaires were administered by two-person civilian data collection

teams. Eligible personnel who did not attend group sessions were mailed a questionnaire along with an explanation of the purpose and anonymity of the survey and instructions for completing and returning it.

These procedures resulted in a sample size of 16,193 respondents and a response rate of 79%. The survey data were weighted and poststratified to reflect the representation of respondents in the population, and adjustments were made for the potential effects of nonresponse.

Measures and Analysis Procedures

Three substance use measures were examined in this paper: heavy drinking, use of any illicit drug, and any cigarette smoking. Heavy drinking refers to consuming five or more drinks per typical drinking occasion at least once a week during the past 30 days and is based on a drinking-level classification scheme adapted from Mulford and Miller (29). Any illicit drug use refers to any use during the past 12 months of marijuana or hashish, phencyclidine (PCP), lysergic acid diethylamide (LSD) or other hallucinogens, cocaine, amphetamines or other stimulants, tranquilizers or other depressants, barbiturates or other sedatives, heroin or other opiates, analgesics or other narcotics, inhalants, or "designer drugs." These or similar measures have been used in a number of major surveys (20, 25, 30, 31). Because of the relatively low prevalence of any illicit drug use during the past 30 days, results are presented for the past 12 months. These are each measures of use, not dependence. However, heavy alcohol use is often accompanied by negative social consequences such as lowered work productivity (32).

Cigarette use was measured in terms of lifetime numbers of cigarettes smoked and the average daily number of cigarettes smoked in the past 30 days. Current smokers were defined as military personnel who reported that they smoked at least 100 cigarettes in their lifetime and who smoked at least once in the 30 days prior to the survey.

Military women and men were asked to appraise the perceived levels of stress that they experienced at work and in their personal relationships and family life. Both military women and men were asked the following two items, and military women were additionally asked the third item:

- During the past 12 months, how much stress did you experience at work or while carrying out your military duties?
- During the past 12 months, how much stress did you experience in your family life or in a relationship with a person you live with or date seriously?
- In the past 12 months, how much stress did you experience as a woman in the Military?

Although these measures of stress are single items and do not provide information about the full context of stress-producing situations, this type of item is often used to depict the level of stress in various settings.

These items on perceived stress were complemented with items about sources of stress and behaviors used to cope with stress. We assessed potential sources of stress in the domains of work and family life with the following question: During the past 12 months, how much stress did you experience from each of the following?

- being deployed at sea or in the field;
- having a PCS;
- problems in your relationships with the people you work with;
- problems in your relationship with your immediate supervisor(s);
- concern about being separated from the Military;
- increases in your workload;
- being away from your family;
- changes in your family, such as the birth of a baby, a divorce, or a death in the family;
- conflicts between your military and family responsibilities;
- problems with money;
- problems with housing;
- health problems that you had;

- and health problems in your family.

We also asked respondents to identify the types of strategies that they use to cope when they "feel pressured, stressed, depressed, or anxious." The list of response categories included items that tap approach and problem-oriented strategies ("think of plan to solve the problem"); emotion-focused strategies, such as seeking social support ("talk to friend or family member"); and avoidance coping ("have a drink," "smoke marijuana or use other illegal drugs," "think about hurting yourself or killing yourself").

Population prevalence estimates and associated standard errors were computed from weighted survey data using the SURvey DATA ANALYSIS (SUDAAN) software package (33). Logistic regressions were also computed using SUDAAN to model outcome measures of heavy drinking, illicit drug use, and cigarette smoking. For alcohol, the probability of being a heavy drinker in the past month was used as the dependent measure. The dichotomous outcome measure was heavy drinking versus other drinking levels (excluding abstainers). For illicit drug use, the probability of using any illicit drugs during the past 12 months was used as the dependent measure. For cigarette use, the probability of smoking cigarettes in the past month was the dependent measure. Both of the latter two measures were also dichotomous variables.

Findings

Substance Use Among Military Women and Men

Table 1 shows the prevalence of active-duty women and men who engaged in heavy alcohol use, any illicit drug use, and any cigarette use in 1995. As shown, military men (18.8%) were over three times more likely than military women (5.3%) to drink heavily. About 1 in 5 men, but only 1 in 20 women, was likely to be a heavy drinker. These gender differences in heavy drinking are consistent with patterns of heavy drinking in the civilian sector, with men more likely to drink heavily than women (30). The prevalence of any illicit drug use showed similar rates among military women (5.3%) and men (6.7%); about 1 in 20 was likely to use illicit drugs in the past year among both men and women. These data differ from those in surveys of civilians, which show higher rates of use by men (30). The rate of cigarette

smoking was 26.3% among military women and 32.7% among military men. Roughly 1 out of 4 military women and 1 out of 3 military men were current smokers. The 1995 smoking rate was considerably higher than the Healthy People 2000 objective of 20% adopted for the Military (34).

Insert Table 1 about here

Although it is clear that substantial substance use was reported among military personnel, our primary interest here is to examine whether it was related to stress experienced by military women and men. To do that, we examine the types and levels of stress perceived by military personnel, consider the basic methods used to cope with stress, then assess the association between substance use and stress.

Appraisal of Stress

Table 2 shows the levels of perceived stress at work, in the family (or personal relationships), and associated with being a woman in the Military. The distributions across response categories indicate two key findings. The first finding is that both military women and men were more likely to describe their military duties as stressful than their family or personal lives. Among women, nearly 4 out of 10 (40.1%) perceived high levels of stress at work (i.e., a "great deal" or a "fairly large amount") compared to about 3 out of 10 (29.3%) who experienced high levels of stress in their families or personal relationships. Among men, a comparable 4 out of 10 (39.1%) perceived high stress at work compared to slightly more than 2 out of 10 (21.5%) in their families. Military women were somewhat more likely to feel high levels of stress in their family or personal relationships (29.3%) than were men (21.5%).

Insert Table 2 about here

The second finding, which applies to women only, is that a third (33.0%) experienced high stress associated with being a woman in the Military. This percentage is slightly higher than the percentage

experiencing stress in their family life (29.3%), but smaller than the percentage reporting stress at work (40.1%).

Specific Sources of Stress

Table 3 presents data on sources of stress for military women and men. It shows that, for women, the most frequently mentioned sources of stress were being away from family (21.1%); major changes in family, such as birth or death of a loved one (17.0%); increases in workload (15.9%); problems in work relationships (15.7%); and problems with supervisors (13.1%). For men, the most frequently mentioned sources of stress were being away from family (23.7%), deployment (17.1%), increases in workload (16.6%), financial problems (15.0%), and conflicts between military and family responsibilities (13.0%).

Insert Table 3 about here

Overall, the percentages of men and women who identified different specific problems as significant sources of stress were quite comparable. For example, Table 3 shows that increases in workload were highly stressful for 16.6% of men and for 15.9% of women, and 15.0% of men and 12.2% of women experienced considerable stress due to financial problems. Some 13.0% of men and 12.8% of women found conflicts between military and family responsibilities to be a significant source of stress, and 10.0% of men and 12.2% of women indicated a PCS as a significant stressor. About 1 in 8 men (12.4%) and women (13.1%) found their relationships with their immediate supervisors to be highly stressful, and problems in relationships with co-workers were highly stressful for 12.4% of men and 15.7% of women. Additionally, 8.7% of men and 7.1% of women reported concerns about separation from the Military, and housing problems were a major stressor for 7.6% of men and 7.5% of women.

In spite of an overall pattern for similar proportions of men and women to appraise specific circumstances at work and in their personal lives as highly stressful, there was substantial variability by gender for several types of circumstances. Related to their military functioning, more men than women

(17.1% vs. 6.9%) perceived deployment at sea or in the field to be a significant stressor. Women were more likely to indicate that major changes in family structure and functioning, such as the birth of a baby, a divorce, or a death in the family (17.0% for women vs. 12.3% for men), were significant stressors. In addition, women were twice as likely as men to indicate that personal health problems (8.6% for women vs. 4.0% for men) were a significant source of stress.

Approaches for Coping with Stress

Coping has been defined in terms of the strategies and processes that individuals use to modify adverse aspects of their environment, as well as to minimize internal distress induced by environmental demands (35, 36). An important dimension of coping is the distinction between problem-focused coping strategies, defined as efforts to recognize, modify, or eliminate the impact of a stressor, and emotion-focused coping strategies, defined as efforts to regulate negative emotions that occur in reaction to a stressor event (37, 38). There is some empirical evidence that problem-focused or approach-oriented coping strategies that attempt to manage the problem are among the more effective ways to deal with stress, although the utility of any approach depends on the demands of the situation and the skill and flexibility of individuals in using various coping strategies.

Table 4 shows the percentage of personnel, by gender for the total DoD, who commonly used specific coping strategies under conditions of stress. As shown, "think of plan to solve problems" was overwhelmingly indicated by military personnel as a "frequently" or "sometimes" implemented coping strategy (87.3%), followed by "talk to friends/family member" (71.9%) and "exercise or play sports" (63.0%). Across all Services, a solid majority of personnel often used these potentially effective problem-focused and approach-oriented coping strategies to deal with stress, daily pressures, and feelings of depression. With respect to generally less effective avoidant coping strategies, 47.0% indicated that they "get something to eat" when confronted with stress, 23.5% "have a drink," and less than 1% used illegal substances. Just over 4% of military personnel considered hurting themselves or committing suicide as a coping option for stress and/or depressive symptoms.

Insert Table 4 about here

Table 4 also shows some potentially significant gender differences. Women were more likely to use social support as a coping strategy than were men (87.6% vs. 69.7%, respectively), but were less likely to turn to alcohol as a method of coping (16.8% for women vs. 24.4% for men). Women also reported a greater tendency than men toward using food substances as a method of coping with stress, anxiety, and depression (57.2% vs. 45.5%, respectively).

Substance Use and Stress

There are many strategies for coping with stress, a number of which were examined and discussed above. Data presented in Table 4 suggest that about one fourth of military personnel used alcohol or cigarettes as a coping mechanism for stress, while few used illicit drugs to cope. To examine the relationship between substance use and stress in more detail, we conducted a series of logistic regression analyses predicting heavy alcohol use, illicit drug use, and cigarette smoking. Separate analyses were conducted for military women and men for each substance, and results were expressed as odds ratios.

The measure of interest for these analyses was the relationship of perceived stress to substance use (i.e., heavy alcohol use, any illicit drug use, cigarette use) after controlling for effects of other sociodemographic factors. Contrasts examined high versus low stress and moderate versus low stress. "High" stress was defined as persons who answered that they had experienced a great deal or fairly large amount of stress in the past 12 months; "moderate" stress was defined as persons who answered that they had experienced some or a little stress in the past 12 months; and "low" stress was defined as those who stated they experienced no stress in the past 12 months. Separate analyses were conducted for measures of stress at work, stress in the family, and stress associated with being a woman in the Military.

Sociodemographic factors included in the models were Service (Army, Navy, Marine Corps, Air Force), race/ethnicity (white, black, Hispanic, other), education (high school or less, some college, college

graduate or higher), age (20 or younger, 21 to 25, 26 to 34, 35 or older), family status (not married, married with spouse not present, married with spouse present), pay grade (E1-E3, E4-E6, E7-E9, W1-W5, O1-O3, O4-O10), and duty location (stationed within CONUS or stationed OCONUS).

Table 5 shows the odds ratios for the types of stress (at work, in the family, being a woman in the Military), and levels of stress (high vs. low, moderate vs. low) from the logistic regression analyses for heavy alcohol use, illicit drug use, and cigarette smoking. For military women, results indicate a significant relationship between illicit drug use and cigarette use and stress associated with being a woman in the Military. Those who perceived high stress being a woman in the Military were over 1.5 times more likely than those with low stress to smoke cigarettes in the past month and over 2.5 times more likely to use illicit drugs during the past 12 months. In contrast, military women showed no significant association between levels of stress at work or in the family and substance use.

Insert Table 5 about here

For military men, results showed significant relationships between levels of stress at work and all three substances and between levels of stress in the family and illicit drug use and cigarette use. More specifically, military men who experienced high stress at work were nearly 1.4 times more likely to drink heavily, over 2.3 times more likely to use illicit drugs and 1.7 times more likely to smoke cigarettes than men with low stress at work. In addition, men who experienced high stress in their families or personal relationships were 1.8 times more likely to use illicit drugs and over 1.5 times more likely to smoke cigarettes than those with low stress.

Discussion and Recommendations

Key Findings

Alcohol, illicit drugs, and cigarettes may be used as a means of coping with and reducing stress (13), although research shows that the nature of this relationship is more complex than once thought (39,

40). Clearly, as shown here, many military personnel experience high levels of stress associated with military work or family life. Military personnel may be in endangered situations or far away from home and family. They may also experience the same types of stressors in their work and family lives as do nonmilitary personnel. Problems with finances may also contribute to stress. Military personnel reported higher levels of stress associated with their work than with their family life overall. However, separation from family was mentioned most frequently by both women and men as the leading source of high stress. This finding is consistent with the fact that work and family are closely intertwined in the Military. Many military women also reported high levels of stress simply because of their status as women in a predominantly male workforce.

In our logistic regression analyses, the strongest associations between stress and substance use were found for military men. Military men who experienced high levels of stress at work were more likely than those reporting low stress to be heavy alcohol users, illicit drug users, or cigarette smokers. Those experiencing high levels of stress in family life were more likely than those reporting low stress to use illicit drugs or to smoke cigarettes. In contrast, among military women, levels of stress at work or in the family were not related to use of alcohol, illicit drugs, or cigarettes. That is, military women did not turn to substance use to cope with high or moderate levels of stress in their military work or in their family and personal relationships. However, military women experiencing high levels of stress associated with being a woman in the Military were significantly more likely than those under low levels of stress to report illicit drug use or cigarette use. Notably, heavy alcohol use among women was unrelated to any type of stress. This latter finding for military women is consistent with research in general population studies of women that have found little evidence for an association between life events and alcohol consumption (41).

Results from the logistic regression analyses are consistent with observations of coping strategies reported by military women and men. Military women were less likely than military men to smoke cigarettes or take a drink when they felt stressed but more likely to talk with friends or family members or

to report "getting something to eat" as a coping strategy. Very few military women or men reported using illicit drugs to cope with stress. Almost 90% of military women and men tried to think of a plan to cope with stress. This is an encouraging finding in that the extant research literature suggests that coping styles aimed at managing problems through direct action of seeking social support are generally more effective than coping strategies that attempt to ignore or avoid the problem (42).

Overall, findings reported here suggest that stress is an important predictor of substance use among military men, but less so among military women. For military women, substance use is primarily associated with the stress of being a woman in the Military. The nature of such stress and the underlying factors contributing to it are not clearly understood, but they may be a result of particular features of military life, the challenges of competing in a predominantly male organization, problems of unwanted sexual advances or harassment by their male counterparts, the result of relatively poor coping skills, or some combination of these or other factors. Not only do stressors and coping mechanisms differ for women and men, but factors related to substance use may also differ.

Because substantial percentages of military women and men reported experiencing work-related stress, examining the nature of the work situation for particular occupations may help inform the gender-based differences in substance use. For example, in analyses of the Epidemiologic Catchment Area (ECA) data, the risk of developing drug abuse or dependence showed the strongest associations with the combination of jobs with high physical demands and either low skill discretion or high decision authority (43). Examination of military jobs with these characteristics in mind may help untangle some of the gender differences in substance use.

The substance use patterns of Military women are themselves distinctive. The similarity of rates of illicit drug use and cigarette smoking among military women and men contrasts with the typically higher rates of use among men found in many civilian studies (30). The substantially higher rates of heavy drinking among military men compared with military women, however, mirrors gender differences found in other studies (26, 28, 30, 31). Additional analyses should consider the factors related to

substance use among military women and the distinctiveness of patterns of substance use among military women relative to military men and civilian women. Prior analyses have suggested that the substance use patterns of military women more closely approximate the substance use patterns of military men than of civilian women (28). The determinants of substance use among military women may differ from those found in civilian studies.

These findings are consistent with prior studies that suggest that the reactions to stress vary by gender (4 - 7). The Military is a stressful workplace for both Military women and men, and both are affected by family-related problems. However, stresses generated by work and family are predictive of heavy alcohol use, illicit drug use, and cigarette smoking for Military men but not for Military women. For women, only the stresses related to being a woman in the Military were predictive of substance use. Although substance use is not evidence of a substance use disorder, it may be problematic for the Military with its emphasis on high levels of performance and readiness. The Military should further investigate the sources of stress among Military personnel and ways to alleviate it, including more effective coping strategies. Although most personnel use problem-focused strategies, some use avoidance coping strategies, such as substance use. Because the link between stress and substance use is especially strong for Military men, more effective stress management strategies may need to be implemented for men to reduce stress as a source of heavy alcohol use, illicit drug use, and cigarette smoking.

All of these findings must be understood within the context of the survey methodology that was used and its corresponding strengths and limitations. The strengths of these data are that they come from a large-scale survey that used probability sampling methods and rigorous field procedures that (a) resulted in a highly respectable response rate and used weighting adjustments to address issues of nonresponse bias, (b) provided anonymity of respondent's answers to enhance candor and truthfulness, and (c) offered maximum generality of findings by ensuring that sample members represented all active-duty military personnel.

Despite these strengths, the study is also subject to limitations associated with self-report data and practical constraints on the number and type of questions that can be included in broad-based questionnaires. Self-report data on sensitive topics such as substance use are often subject to underreporting and hence are likely to yield conservative estimates of use. Further, considerations of respondent burden and the total array of issues to be addressed placed limits on the number and complexity of the measures of stress and coping that could be included. Indices assessing these constructs were based on fewer items than those typically used in smaller clinical studies. Similarly, it was not possible to include multiple measures of constructs to assess convergent validity of responses. Nonetheless, the findings reported here have important implications for military personnel and provide useful insights into the stressors they experience at work and in their personal lives and the coping mechanisms they use to deal with these stressors.

References

1. Folkman, S., and Lazarus, R. S., An analysis of coping in a middle-aged community sample, *J. Health Soc. Behav.* **21**:219-239 (1980).
2. Folkman, S., and Lazarus, R. S., If it changes it must be a process: Study of emotion and coping during three stages of a college examination, *J. Pers. Soc. Psychol.* **48**:150-170 (1985).
3. Foa, E. B., Steketee, G., and Olasov Rothbaum, B., Behavioral/cognitive conceptualizations of post-traumatic stress disorder, *Behav. Therapy* **20**:155-176 (1989).
4. Horwitz, A. V., and Davies, L., Are emotional distress and alcohol problems differential outcomes to stress? An exploratory test, *Soc. Sci. Q.* **73**:607-621 (1994).
5. Pianta, R. C., and Egeland, B., Relation between depressive symptoms and stressful life events in a sample of disadvantaged mothers, *J. Consult. Clin. Psychol.* **62**:1229-1234 (1994).
6. Bromet, E. J., Dew, M. A., Parkinson, D. K., et al., Predictive effects of occupational and marital stress on the mental health of a male workforce, *J. Organizational Behav.* **9**:1-13 (1988).
7. Gorman, D. M., Employment, stressful life events and the development of alcohol dependence, *Drug Alcohol Depend.* **22**:151-159 (1988).
8. Conway, R. L., Vickers, R. R., Jr., Ward, H. W., et al., Occupational stress and variation in cigarette, coffee, and alcohol consumption, *J. Health Soc. Behav.* **22**:155-165 (1981).
9. Brown-Rowat, B., Amsel, R., and Jeans, M. E., Professional and executive women: Health and lifestyle characteristics, *Health Care Women Int.* **11**:133-149 (1990).
10. Frone, M. R., Cooper, M. L., and Russell, M., Stressful life events, gender and substance use: An application of tobit regression, *Psychol. Addictive Behav.* **8**(2):59-69 (1994).
11. Breslin, F. C., O'Keefe, M. K., Burrell, L., et al., The effects of stress and coping on daily alcohol use in women, *Addict. Behav.* **20**:141-147 (1995).
12. Cooper, M. L., Russell, M., Skinner, J. B., et al., Stress and alcohol use: Moderating effects of gender, coping, and alcohol expectancies, *J. Abnorm. Psychol.* **101**(1):139-152 (1992).

13. McFall, M. E., Mackay, P. W., and Donovan, D., Combat-related posttraumatic stress disorder and severity of substance abuse in Vietnam veterans, *J. Stud. Alcohol* **53**:357-363 (1992).
14. Kulka, R. A., Schlenger, W. E., Fairbank, J. A., et al., *Trauma and the Vietnam War Generation*, Brunner/Mazel, New York, 1990.
15. Department of Defense, *Alcohol and drug abuse by DoD personnel* (Directive No. 1010.4), Washington, D.C., August 25, 1980; revised September 3, 1997.
16. Department of Defense, *Alcohol abuse by personnel of the Department of Defense* (Directive No. 1010.2), Washington, D.C., March 1972.
17. Department of Defense, *Education and training in alcohol and drug abuse prevention* (Instruction No. 1010.5), Washington, D.C., December 5, 1980.
18. Department of Defense, *Rehabilitation and referral services for alcohol and drug abusers* (Instruction No. 1010.6), Washington, D.C., March 13, 1985.
19. Department of Defense, *Health promotion*, Washington, D.C., March 11, 1986.
20. Bray, R. M., Kroutil, L. A., Wheelless, S. C., et al., *1995 Department of Defense Survey of Health Related Behaviors Among Military Personnel*, Research Triangle Institute, Research Triangle Park, N.C., 1995.
21. Burt, M. A., Biegel, M. M., Carnes, Y., et al., *Worldwide Survey of Non-medical Drug Use and Alcohol Use Among Military Personnel: 1980*, Burt Associates, Inc., Bethesda, Md., 1980.
22. Bray, R. M., Guess, L. L., Mason, R. E., et al., *1982 Worldwide Survey of Alcohol and Non-medical Drug Use Among Military Personnel* (RTI/2317/01-01F), Research Triangle Institute, Research Triangle Park, N.C., 1983.
23. Bray, R. M., Marsden, M. E., Guess, L. L., et al., *1985 Worldwide Survey of Alcohol and Nonmedical Drug Use Among Military Personnel*, Research Triangle Institute, Research Triangle Park, N.C., 1986.

24. Bray, R. M., Marsden, M. E., Guess, L. L., et al., *1988 Worldwide Survey of Substance Abuse and Health Behaviors Among Military Personnel*, Research Triangle Institute, Research Triangle Park, N.C., 1988.
25. Bray, R. M., Kroutil, L. A., Luckey, J. W., et al., *1992 Worldwide Survey of Substance Abuse and Health Behaviors Among Military Personnel*, Research Triangle Institute, Research Triangle Park, N.C., 1992.
26. Bray, R. M., Kroutil, L. A., and Marsden, M. E., Trends in alcohol, illicit drug, and cigarette use among U.S. military personnel: 1980-1992, *Armed Forces & Society* **21**: 271-293 (1995).
27. Bray, R. M., Marsden, M. E., Herbold, J. R., et al., Progress toward eliminating drug and alcohol abuse among U.S. military personnel, in *Challenges in Military Health Care: Perspectives on Health Status and the Provision of Care* (J. Stanley and J. D. Blair, Eds.), Transaction Publishers, New Brunswick, N.J., 1993, pp. 33-53.
28. Bray, R. M., Marsden, M. E., and Peterson, M. R., Standardized comparisons of the use of alcohol, drugs, and cigarettes among military personnel and civilians, *Am. J. Public Health* **81**:865-869 (1991).
29. Mulford, H. A., and Miller, D. A., Drinking in Iowa: 2. The extent of drinking and selected sociocultural categories, *Q. J. Stud. Alcohol* **21**:26-39 (1960).
30. Office of Applied Studies, Substance Abuse and Mental Health Services Administration, *National Household Survey on Drug Abuse: Main Findings 1995* (DHHS Publication No. SMA 97-3127), U.S. Government Printing Office, Hyattsville, Md., 1997.
31. Clark, W. B., and Hilton, M. E., Eds., *Alcohol in America: Drinking Practices and Problems*, State University of New York Press, Albany, N.Y., 1991.
32. Bray, R. M., Kroutil, L. A., Rounds-Bryant, J. L., et al., *Alcohol Use, Alcohol-Related Problems, and Perceived Stress and Coping Among U.S. Marine Corps Personnel* (RTI/6330/06-FR), Research Triangle Institute, Research Triangle Park, N.C., January 1997.

33. Shah, B. V., Barnwell, B. G., and Bieler, G. S., *SUDAAN User's Manual: Release 6.4*, Research Triangle Institute, Research Triangle Park, N.C., 1995.
34. U.S. Public Health Service, *Healthy People 2000: National Health Promotion and Disease Prevention Objectives—Full Report, with Commentary* (DHHS Publication No. PHS 91-50212), U.S. Department of Health and Human Services, Washington, D.C., 1991.
35. Lazarus, R. S., *Psychological Stress and the Coping Process*, McGraw-Hill, New York, 1966.
36. Moos, R., and Billings, A., Conceptualizing and measuring coping resources and processes, in *Handbook of Stress: Theoretical and Clinical Aspects* (L. Goldberger and S. Breznitz, Eds.), Macmillan, New York, 1982, pp. 212-230.
37. Auerbach, S. M., Stress management and coping research in the health care setting: An overview and methodological commentary, *J. Consult. Clin. Psychol.* **57**:388-395 (1989).
38. Lazarus, R. S., and Folkman, S., *Stress, Appraisal, and Coping*, Springer, New York, 1984.
39. Brunswick, A. F., Lewis, C. S., and Messeri, P. A., Drug use and stress: Testing a coping model in an urban African-American sample, *J. Community Psychol.* **20**:148-162 (1992).
40. Martin, J. K., Blum, T. C., and Roman, P. M., Drinking to cope and self-medication: Characteristics of jobs in relation to workers' drinking behavior, *J. Organizational Behav.* **13**:55-71 (1992).
41. Cook, D. J., and Allan, C. A., Stressful life events and alcohol abuse in women: A general population study, *Br. J. Addict.* **79**:425-430 (1984).
42. Aldwin, C. M., Coping with traumatic stress, *PTSD Res. Q.* **4**(3):1-3 (1993).
43. Muntaner, C., Anthony, J. C., Crum, R. M., et al., Psychosocial dimensions of work and the risk of drug dependence among adults, *Am. J. Epidemiol.* **142**:183-190 (1995).

Table 1. Substance Use Among Military Women and Men

Substance	Women	Men	Total
			DoD
Illicit drug use, past year	5.3	6.7	6.5
Heavy alcohol use, past month	5.3	18.8	17.1
Cigarette use, past month	26.3	32.7	31.9

Note: Table entries are percentages of personnel who reported substance use.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995.

Table 2. Levels of Perceived Stress Among Military Women and Men

Type of stress/ level of stress	Women	Men	Total DoD
Stress at work			
Great deal	17.6	15.7	16.0
Fairly large amount	22.5	23.4	23.3
Some	30.7	29.7	29.8
A little	22.7	20.6	20.9
None	6.5	10.5	10.0
Stress in family			
Great deal	13.4	8.8	9.3
Fairly large amount	15.9	12.7	13.1
Some	27.3	27.1	27.2
A little	26.9	30.6	30.1
None	16.6	20.8	20.3
Stress being a woman in Military			
Great deal	16.2	NA	16.2
Fairly large amount	16.8	NA	16.8
Some	35.4	NA	35.4
A little	18.4	NA	18.4
None	13.2	NA	13.2

Note: Table entries are column percentages of personnel who reported the indicated levels of stress in the past 12 months (i.e., in the year before the survey period).

NA = Not applicable.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995.

Table 3. Specific Sources of Stress, Past 12 Months, by Gender, Total DoD

Stressor	Women	Men	Total DoD
Deployment	6.9	17.1	15.9
Having a PCS ^a	12.2	10.0	10.3
Work relationships	15.7	12.4	12.8
Problems with supervisor	13.1	12.4	12.5
Concern about separation from the Military	7.1	8.7	8.5
Increases in workload	15.9	16.6	16.5
Being away from family	21.1	23.7	23.4
Changes in family	17.0	12.3	12.8
Conflicts between military and family responsibilities	12.8	13.0	13.0
Financial problems	12.2	15.0	14.6
Housing problems	7.5	7.6	7.6
Personal health problems	8.6	4.0	4.6
Family health problems	9.1	7.4	7.6

Note: Table entries are percentages of personnel who reported "a great deal" or a "fairly large amount" of stress in the past 12 months (i.e., in the year before the survey period).

^aPCS = Permanent change of station.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995.

Table 4. Behaviors for Coping with Stress, by Gender, Total DoD

Coping behavior	Women	Men	Total
			DoD
Talk to friend/family member	87.6	69.7	71.9
Light up a cigarette	24.0	26.7	26.4
Have a drink	16.8	24.4	23.5
Exercise or play sports	60.1	63.4	63.0
Get something to eat	57.2	45.5	47.0
Smoke marijuana/use illegal drugs	0.8	0.8	0.8
Think of plan to solve problem	89.3	87.1	87.3
Consider hurting or killing yourself	3.8	4.2	4.2

Note: Table entries are percentages of personnel who "frequently" or "sometimes" engage in a behavior when they feel pressured, stressed, depressed, or anxious.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995.

Table 5. Perceived Stress and the Odds of Substance Use

Gender/stress	Illicit		
	Heavy alcohol use, past month	drug use, past 12 months	Cigarette use, past month
Women			
Stress at work			
High vs. low	1.60	1.47	1.20
Moderate vs. low	1.74	.92	.99
Stress in family			
High vs. low	1.28	1.10	.86
Moderate vs. low	1.20	1.44	.86
Stress being a woman in Military			
High vs. low	.97	2.54*	1.52**
Moderate vs. low	.70	1.99	1.29

See notes at end of table.

(continued)

Table 5. Continued

Gender/stress	Heavy	Illicit	Cigarette use,
	alcohol use,	drug use,	
	past month	past 12 months	past month
Men			
Stress at work			
High vs. low	1.37**	2.32***	1.70***
Moderate vs. low	1.01	1.54	1.21*
Stress in family			
High vs. low	1.26	1.81***	1.53***
Moderate vs. low	1.02	1.31*	1.13

Note: Data are odds ratios of substance use adjusted for effects of military service, race/ethnicity, education, age, family status, pay grade, and duty location. Sample sizes for women ranged from 2,031 to 2,966; for men, sample sizes ranged from 10,403 to 13,171.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995.

Main Title: Does Stress Differentially Affect the Work Performance of Military Women and Men? Findings from a Worldwide Survey of U.S. Military Personnel

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**Does Stress Differentially Affect the Work
Performance of Military Women and Men?
Findings from a Worldwide Survey of U.S. Military Personnel**

ABSTRACT

Objectives. This study examined the relationships between several domains of stress and level of work performance among women and men in the U.S. armed forces. It also examined the association of coping style, substance use (including alcohol use), and symptoms of depression with level of work performance for military women and men.

Methods. Multivariate cumulative logistic regression analyses were conducted with data from the 1995 Department of Defense Survey of Health Related Behaviors Among Military Personnel. Data were collected in group sessions using a self-administered questionnaire completed anonymously by a representative worldwide sample of 16 193 active-duty military personnel.

Results. For both women and men, higher levels of work-related stress, health-related stress, and depression increased the odds of lower level of job-functioning. In addition, for men only, higher levels of family stress, use of a negative coping style, illicit drug use, and being a heavy drinker increased the odds of lower job functioning. The effects of stress and depression on job functioning were quite similar for women and men.

Conclusions. It may be useful for military health providers to focus on interventions to identify, prevent, and provide therapeutic care for stress-related problems and depression for military personnel, in that these problems affect military men and women's ability to function well on the job. Similarly, interventions may be needed to improve military work environments and work relationships. Continuing efforts to reduce illicit drug use and drinking are warranted.

Introduction

Both military women and men are exposed to a wide range of stressors as a part of military training and work assignments (Bijur et al., 1997; Orasanu & Baker, 1996). In addition, military women may also experience stressors related to being a woman in a predominantly male work environment (McGlohn, King, Butler, & Retzlaff, 1997; Norwood, Ursano, & Gabbay, 1997). Research in the past two decades has pointed to at least three distinct elements of the stress and coping process: (a) the type of stressor or environmental demand; (b) psychosocial mediators, such as an individual's appraisal of the stressor (i.e., the meanings people attach to life events and chronic stressors) and coping style (e.g., avoidant or problem focused); and (c) the resulting psychosocial, physiological, and behavioral outcomes (Aldwin, 1993; Folkman & Lazarus, 1984; Hobfoll, 1989). In addition, recent studies have broadened our understanding of the biology of stress and the physiologic response to stress. The relatively new field of psychoneuroimmunology, which examines the influence of the central nervous system (CNS) on the immune system, has concentrated on studies of how stress-related thoughts and feelings affect human immune system functioning (Black, 1994). Evidence exists for CNS-immune system interactions, neuroendocrinologic responses of the organism to stress, and major stress-induced neuromediators that affect a down-regulation of immune system functioning (Black, 1994). Studies now show that the physiologic response to stress—determined by both an individual's state of physical health and how she or he perceives a situation—can have long-term health effects (McEwen, 1998). Stress-induced immunosuppression, resulting from a mechanism referred to as “allostatic load,” may render individuals vulnerable to illness and injury. The allostatic system refers to the autonomic nervous system, the hypothalamic-pituitary-adrenal (HPA)

axis, and the cardiovascular, metabolic, and immune systems that protect the body by responding to internal and external stress (McEwen, 1998). Chronic overactivity or underactivity of allostatic systems due to chronic stress or repeated exposure to stressful life events has been shown to predict declines in cognitive and physical functioning. An inappropriate physiological response to stressful stimuli through allostatic load has been shown to affect the cardiovascular and metabolic systems, brain functioning and memory impairment, and down-regulation of the immune system (McEwen, 1998).

The link between perceived stress and impaired functioning on the job is well-documented, demonstrating an inverted "U"-shaped relationship between stress and performance. That is, employees who experienced a moderate degree of job stress performed their job most efficiently, while low work-related stress correlated negatively and high work stress, positively, with job performance (Srivastava & Krishna, 1991). Depressive symptomatology also has been shown to relate to lower performance at work, independent of interpersonal stress attributed to co-workers and others and job stress related to dissatisfying work (Martin, Blum, Beach, & Roman, 1996). The moderating effects of various physiological, individual characteristic, situational, organizational, and sociological variables on the stress-job performance relationship have also been well-examined (Bowers, Weaver, & Morgan, 1996). These moderators act by contributing to or reducing the resources that the individual can bring to bear in coping with stressors (Bowers et al., 1996). Studies examining the moderating effect of coping style in particular, however, have not consistently shown benefits of positive coping strategies. A longitudinal study on the effects of coping on work performance and report of stress symptoms (Nelson & Sutton, 1990) found no association or moderating effect of coping style with job performance. The study suggested a

possible dispositional influence on stress symptoms—the distress symptoms reported prior to beginning a new job explained significant variance in distress symptoms reported after beginning work (Nelson & Sutton, 1990).

Women's health research in the past decade has shown that women consistently report higher levels of stress and illness symptoms relative to men (Cleary, 1987; Frankenhaeuser, 1991; Gijsbers Van Wijk et al., 1991; Hibbard, 1983). A consistent finding in psychiatric research is that rates of depression among women are at least twofold higher than among men (Sherrill et al., 1997; Weissman et al., 1996; Wickramaratne, Weissman, Leaf, & Holford, 1989). Studies of gender differences in the rate, nature, and timing of life events associated with depression have shown inconsistent results, in part due to differences in the methods used and the results examined. The literature suggests the relationship between gender and onset of depression is conditioned more by the *type* of life events that are salient for men versus women (i.e., women are more likely than men to report events involving their social network) rather than the *quantity* of events experienced (Sherrill et al., 1997). Stressful life events may play a larger role in the provocation of recurrent episodes of depression for women than for men, but there do not appear to be sex differences in the extent to which "interpersonal vs. noninterpersonal" events or difficulties are associated with depression (Sherrill et al., 1997).

Subject to debate is whether women's greater experience of stress is due to gender-related differences in appraisal of stress or coping, their greater readiness to report stress and illness symptoms, or their greater exposure to stressful life events or chronic stressors relative to men (Gijsbers Van Wijk et al., 1991; Miller & Kirsch, 1987; Sherrill et al., 1997; Verbrugge, 1990). There has been little examination of gender differences in the effects of stress on functional

impairment at work; still less attention has been paid to the effects of a range of stressor types on the working lives of military women and men, and gender differences in the functional sequelae to stress in this population. As issues of gender and equity in the military are debated in the media, and policymakers at the Pentagon and in Congress rethink gender integration, information is needed to provide an empirical basis for informing critical military and public policy decisions on how to structure the training and working relationships of men and women in the armed forces.

This study provides important data bearing on one aspect of this important issue: the effect of stress on job functioning for military women and men. Analyses draw on data from the 1995 DoD Survey of Health Related Behaviors Among Military Personnel (Bray et al., 1995) and examine the association of work-related stress, family-related stress, financial stress, health-related stress and coping style with functioning at work among military personnel.

Methods

Sampling Design and Data Collection

The sample for the 1995 DoD survey was selected using a stratified, two-stage probability design. The eligible survey population consisted of all active-duty personnel, excluding recruits, service academy students, persons absent without official leave, and persons who had a permanent change of station at the time of data collection. The first stage of sampling involved selection of military installations stratified by branch of Service (Army, Navy, Marine Corps, and Air Force) and world region (within and outside the continental United States). Within the selected installations, the second stage of sampling involved selection of military personnel stratified by pay grade (E1-E3, E4-E6, E7-E9, W1-W5, O1-O3, O4-O10) and gender (male, female). The

sample was selected to be representative of the active-duty force worldwide. Women and officers were oversampled because of their smaller numbers.

Data were collected between April and August 1995 using self-administered questionnaires completed anonymously by respondents. The questionnaire averaged about 55 minutes to complete. Most respondents (88%) attended group sessions at 59 installations, where questionnaires were administered by civilian data collection teams. Eligible personnel who were not able to attend group sessions were mailed a questionnaire along with an explanation of the purpose and anonymity of the survey, as well as instructions for completing and returning it. The overall response rate among eligible survey participants was 70%. The data were weighted and post-stratified to reflect the representation of the population, and adjustments were made to offset the potential effects of nonresponse. The final sample consisted of 16,193 respondents, including 13,219 men and 2,974 women; of these, 12,531 were enlisted personnel and 3,662 were officers. SURvey DATA ANalysis (SUDAAN) software (Shah, Barnwell, & Bieler, 1995) was used to account for unequal weighting, stratification, and clustering of the sample.

Measures

For multivariate cumulative logistic regression analysis, an ordinal categories dependent measure was constructed to reflect the level of job functioning. We constructed the dependent measure by assigning scores to each of five items (listed below) and summing them. The scores represent the number of workdays in the past year on which these things happened: the respondent (1) was late for work by 30 minutes or more, (2) left work early for a reason other than an errand or early holiday leave, (3) was hurt in an on-the-job accident, (4) worked below normal level or performance, and (5) did not come to work at all because of an illness or a personal accident. The

total number of days on which the above behaviors occurred was categorized into the following ordinal levels: 0 days, 1-4 days, 5-8 days, and 9 or more days.

The key independent measures examined in the cumulative logistic regression were four domains of stressors: work-related stress, family-related stress, financial stress, and health-related stress. In addition, measures of negative and positive ways of coping with stress were included. Measures of substance use problems and depression also were included as independent variables in the models, and sociodemographic characteristics were used as control variables.

We operationalized stressor types by examining the correlation of responses to a series of questions on the potential sources of stress for military personnel in the domains of their work and family life. The pattern of correlations among the question responses was consistent with domains of stressors identified in the literature. The response to each of the 13 questions was scored from "1 (no stress)" to "5 (great deal of stress)." Scores for questions related to a particular stress domain were summed and standardized and resulted in four scales: work-related stress, family-related stress, financial stress, and health stress.

Items used to define *work-related stress* were being deployed at sea or in the field; having a permanent change of station; having problems in relationships with co-workers; having problems in relationship with immediate supervisor; experiencing concern about being separated from the military; and experiencing stress from increases in workload. Items used to define *family-related stress* were being away from family and experiencing changes in the family, such as the birth of a baby, a divorce, or a death, and conflicts between military and family responsibilities. Items used to define *financial stress* were experiencing problems with money

and problems with housing. Items used to define *health-related stress* were health problems experienced by military members and health problems experienced in one's family.

To measure depressive symptomatology, we asked respondents whether, in the past 12 months, (a) they had 2 weeks or more in which they "felt sad, blue, or depressed," or (b) they felt sad or depressed much of the time. Those indicating a positive response for either or both items were scored as a one; others were scored as a zero. To assess illicit drug use, we asked respondents whether in the past 12 months they used marijuana, phencyclidine (PCP), lysergic diethylamide (LSD), cocaine, amphetamines, tranquilizers, barbiturates, heroin, analgesics, inhalants, or "designer drugs" at least once. Those indicating "yes" to one or more items were scored as a one; others were scored as a zero.

We used a multilevel measure of alcohol consumption, obtained through an algorithm measuring frequency and quantity of alcohol consumed in the past year and past month. We classified the report of past 12-month alcohol consumption as "heavy drinking" if the respondent (a) drank five or more drinks per typical drinking occasion at least once a week (for men) or (b) drank four or more drinks per typical drinking occasion two to three times per month (for women). Different consumption levels for defining heavy drinking were employed for men and women to account not only for potential differences in body mass, but also to account for women's higher susceptibility to the physiological consequences of alcohol (Deal & Gavalier, 1994; Wilsnack, Wilsnack, & Hiller-Sturmhofel, 1994) and their greater likelihood to underestimate the quantity of alcohol they consume (Lemmens, 1994; Marmot et al., 1994; Sobell, Cunningham, & Sobell, 1996; WHO Brief Intervention Study Group, 1996). Four other drinking

levels also were defined: abstainers, infrequent/light, moderate, and moderate/heavy as described by Bray et al. (1995).

We developed two variables measuring two coping styles: a positive, action-oriented coping style and a negative coping style. Coping styles are thought to be relatively stable characteristics and are divided into basic types: avoidant (i.e., ignores the problem but takes steps to reduce negative affect), and problem focused (i.e., does something to remove the source of stress (Roth & Cohen, 1986). In general, problem-focused coping is associated with better health outcomes. To develop the measures, we first conducted a principal components analysis with varimax rotation on eight variables in the survey questionnaire drawn from several coping indexes (Keppel & Zedeck, 1989) to identify underlying factors related to coping styles. The eight items loaded heavily (factor loadings ranged from .45 to .68) on two factors consistent with an “avoidant” coping style and a “problem-focused” style. This finding matches the theoretical groundwork characterizing two general coping styles. The response to each item was scored from “1 (never)” to “4 (frequently)” with respect to engaging in that activity when feeling “pressured, stressed, depressed, or anxious.” A positive coping was constructed by summing the responses to the following three items: (1) talking to a friend or family member, (2) exercising or playing sports, or (3) thinking of a plan to solve the problem. A negative coping measure was constructed by summing the responses to the following five items: (1) lighting up a cigarette, (2) drinking, (3) using illicit drugs, (4) getting something to eat, or (5) thinking about hurting or killing one’s self. The scores were standardized to a mean of zero and a standard deviation of one.

Analysis Procedures

Population prevalence estimates and associated standard errors were computed from weighted survey data using the SUDAAN software (Shah et al., 1995). Multiple cumulative logistic regression analyses were also computed using SUDAAN to model a four-level ordinal categories job function measure separately for both women and men.

The dependent variable was the number of workdays in the past year in which negative events occurred. This measure was highly skewed in that most subjects, both male and female, had experienced either no problematic workdays or only a few. Because there were a substantial number of zeros, a log or reciprocal transformation to make the distribution at least approximately normal was not feasible. Thus, it was decided, on the basis of the distribution, to create four ordered categories (0 days, 1-4 days, 5-8 days, and 9 or more days) to be used as the dependent variable. The independent variables were both continuous and categorical.

A cumulative logit or proportional odds model was fit to the data using SUDAAN. The cumulative logit model takes advantage of the fact that the dependent variable categories are ordered and assumes that the effect of the independent variables on the odds of being in a higher category versus a lower category is the same regardless of the location of the cutpoint. That is, the effect of an independent variable is the same for modeling the following odds: being in a 1 or more day category (i.e., the three highest categories) versus the 0 days category; being in a 5-8 day or 9 or more day category versus being in a 0 or 1-4 day category; and being in a 9 or more day category versus being in a 0 day or 1-4 days, or 5-8 days category.

There are advantages in using a cumulative logit model over a standard logistic regression. A standard logistic regression model forces one to select a single cutpoint to divide an ordered variable into two categories. Sometimes, as in this case, when there is no natural

cutpoint, defining one becomes arbitrary. If we can create a number of ordered categories, then the cutpoints become less arbitrary. In addition, we use more information concerning the dependent variable and accordingly the parameter estimates associated with the independent variables become more precise if the assumptions of the model are satisfied.

Results

Demographic Characteristics

Table 1 displays a summary of the counts of the respondents and the demographic characteristics of the eligible respondent population. Overall, the majority of respondents were young (mostly younger than 35 years), mostly white, mostly enlisted rather than officer, and moderately well-educated (most had some education beyond high school).

Several demographic differences between women and men in the active-duty military were notable. A higher proportion of women (26%) than men (16%) were African American, men (72%) were more likely than women (62%) to have some education beyond high school, and men were more likely to be married (62%) than women (51%). Women were more likely to serve in the Air Force than other branches of service, whereas men were more likely to serve in the Army or Navy. The gender gap by branch of service was widest for the Marine Corps, where men were three times more likely than women (12% vs. 4%) to be Marines.

[Insert Table 1 about here]

Appraisal of Perceived Stress Among Military Personnel

We conducted analyses of the levels of perceived stress that military personnel indicated in their experience at work and in their personal relationships and family life, and, for women, perceived stress being a woman in the military. The findings in Table 2 show distributions across

response categories for each type of stress by gender, indicating that about 40% of both women and men perceived a great deal or a fairly large amount of work stress. As reported previously (Bray, Fairbank, & Marsden, in press), military personnel overall were more likely to report more stress in their military work (16%) than in their family life (9%). However, in a t-test comparing the mean scores of men and women, military women (3.23) were significantly more likely than men (3.09) to describe their work as stressful. Women (2.81) were also significantly more likely than men (2.56) to describe their family or personal life as stressful.

[Insert Table 2 about here]

About 29% of women perceived a great deal or a fairly large amount of family stress versus about 22% for men. It is impossible to determine in this study whether military women's greater reported family stress relative to that of men may be due to gender differences in the appraisal of stress or gender norms related to the report of family problems. The finding could indicate differences in men's and women's level of responsibility for childcare or household duties, perhaps leading to role overload or role conflict for women balancing a career in the military with lives at home. In addition, there may be gender role-related differences in the level of stress men and women experience as a result of being away from family members due to deployment or duty assignments, or family problems such as separation or divorce. An estimated 33% of the women reported a great deal or a fairly large amount of stress due to being a woman in the military. Because we wanted to have comparable models for both women and men, this variable was not included as an independent variable in the regression models.

Stress-Related Factors Associated with Impaired Job Functioning

To better understand these gender differences, we conducted multivariate analyses to examine the associations between the sources and levels of stress and the level of job functioning. Table 3 displays the findings from multivariate cumulative logistic regression models testing the associations of stressor types, depression, and illicit drug use with level of job functioning for military women and men. We ran the models for women and men separately.

[Insert Table 3 about here]

The models were identical except for the construction of the heavy drinking measure described above, which accounted for gender-appropriate alcohol consumption levels. Independent measures included the four stress scales (i.e., work-related stress, financial stress, family-related stress, and health-related stress), positive and negative coping styles, symptoms of depression, heavy drinking, illicit drug use, and demographic characteristics. Although the main focus of the regression analyses was on the effect of stress on job functioning, the other variables were included because they also could affect job functioning and be correlated with stress. In addition, the effects of depressive symptoms, drinking, and illicit drug use are of some interest in themselves. The demographic variables, however, were strictly used as control variables; consequently, their effects are not discussed.

The odds ratios seen in Table 3 reflect a change in the odds of being in a lower job-functioning category as a function of an increase by one standard deviation for the four stress and two coping measures. Initially, each model tested the main effect of coping style on the outcome, as well as the interaction of each coping style with each of the four stress types on the outcome. Because the interaction terms were not significant, they were not included in the final model.

Analyses showed that the stressor types predictive of a lower level of functioning at work were similar for women and men. An increase by one standard deviation on the work-related stress scale increased the odds of being in a lower job functioning category by 28% for women and 15% for men. An increase by one standard deviation on the health-related stress scale increased the odds of lower functioning at work by about 30% for both women and men. However, family-related stress significantly increased the odds of lower job functioning by 19% for men, but it was not significant for women. Symptoms of depression also increased the odds of lower job functioning by about 30% for both women and men.

Several other measures were significantly associated with job functioning for men but not for women. One standard deviation change in the negative coping measure increased the odds of lower functioning by 15% for men, illicit drug use increased the odds by 35%, and being a heavy drinker versus an abstainer or light drinker increased the odds of lower job functioning by about 20%. Age and race/ethnicity also were associated with job functioning, but they are not discussed because they were used as control variables.

Discussion

The findings indicate that exposure to both work- and health-related stress is associated with a lower level of job functioning at work for military women and men alike. Similarly, symptoms of depression also increased the odds of a lower level of job functioning for both women and men. Additionally, among men only, family-related stress, heavy drinking, illicit drug use, and negative coping style increased the odds of lower job functioning.

Preliminary analyses indicated that military women were significantly more likely than their male counterparts to describe their work and their family or personal life as stressful.

Notably, multivariate analyses suggest that despite military women's greater report of work and family stress, stress is no more likely to impair their job functioning than it impairs the job functioning of male personnel. In fact, the job performance of female personnel appears less likely than that of male personnel to be impaired by certain types of stress, negative coping, and substance abuse. The stress associated with such events as being away from one's family, conflicts between military and family responsibilities, or significant changes, such as the birth, divorce, or death, did not significantly affect the capacity to function at work for women, but did so for men. Apparently, military men are less able than female personnel to manage family-related stressors so that they do not negatively affect work. Moreover, although positive coping was not related to job functioning for either women or men, negative coping was associated with lower job functioning for men only. The negative coping measure comprised two items related to the use of alcohol or drugs to cope with stressful events; although rates of substance use among military women are higher than those among female civilians and more closely match those of military men, prior studies indicate that male personnel are more likely than female personnel to drink heavily and use illicit drugs (Bray et al., 1995). The finding that negative coping affects impaired job functioning for men may relate to the observed effects of heavy drinking and illicit drug use on men's functioning at work.

The finding that work- and health-related stress is associated with lower job functioning for military personnel confirms prior research clearly linking exposure to stress with lower functioning on the job; of note again, the finding suggests little difference between men and women in functional impairment related to these types of stress. Similarly, depressive symptoms were no more likely to affect the job functioning of women than depressive symptoms affect that

of men. Although rates of depressive symptoms tend to be higher among women than men, there appear to be no gender-related differences in the effect of depressive symptoms on lower functioning on the job. Men are as likely as women to need therapeutic and preventive interventions to ameliorate the effects of depressive symptoms and stress.

These findings suggest that it may be useful for military health providers to focus on interventions to identify, prevent, and provide therapeutic care for stress-related problems and depression for military personnel, in that these problems affect military men and women's ability to function well on the job. Similarly, interventions may be needed to improve military work environments and work relationships, which are a locus of stress for both women and men and affect their job performance. More attention to health concerns also may be beneficial. Finally, intervention strategies to reduce family-related stress, especially for males, also may pay dividends.

Physicians and other health care providers, mental and public health specialists, and military administrators should focus on interventions to reduce the allostatic load of military personnel, aimed at both individual-level and also organizational change. Providers can help military personnel reduce allostatic load by helping them to learn coping skills, recognize their own limitations, and relax (McEwen, 1998). Evaluations of personal stress management programs have found that most programs were found to lower all or some somatic measures of stress and cognitive measures of anxiety, as well as to improve work performance (Bernier & Gaston, 1989). Providers can also remind personnel about the relationship between physical and mental well-being, the interactions of a high fat diet and stress in atherosclerosis, the role of smoking in cardiovascular disease and cancer, and beneficial effects of exercise. Two important

causes of allostatic load appear to be isolation and lack of control in the work environment.

Organizational interventions that increase social support and enhance coping have been shown to prolong the life spans of patients with breast cancer, lymphomas, and malignant melanoma.

Interventions designed to increase a worker's control over his or her job also have improved health and attitudes toward work (McEwen, 1998). Finally, efforts to ensure the equitable provision of these services to both male and female personnel should be supported, as should efforts to maintain women's access to the training and career opportunities within the military that are available to men.

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References

- Aldwin, C.M. (1993). Coping with traumatic stress. PTSD Research Quarterly, 4(3), 1-3.
- Bernier, D., & Gaston, L. (1989) Stress management: A review. Canada's Mental Health, 37(3), 5-19.
- Bijur, P., Horodyski, M., Egerton, W., et al. (1997). Comparison of injury during cadet basic training by gender. Archives of Pediatrics and Adolescent Medicine, 151(5), 456-466.
- Black, P. (1994). Central nervous system-immune system interactions: Psychoneuroendocrinology of stress and its immune consequences. Antimicrobial Agents and Chemotherapy, 38(1), 1-6.
- Bowers, C.A., Weaver, J.L., & Morgan, B.B., Jr. (1996). Moderating the performance effect of stressors. In J.E. Driskell, E.E. Salas, et al. (Eds.), Stress and human performance (pp. __-__). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Bray, R.M., Fairbank, J.A., & Marsden, M.E. (in press). Stress and substance use among military women and men. American Journal of Drug and Alcohol Abuse.
- Bray, R.M., Kroutil, L.A., Wheelless, S.C., Marsden, M.E., Bailey, S.L., Fairbank, J.A., & Harford, T.C. (1995). 1995 Department of Defense Survey of Health Related Behaviors Among Military Personnel (RTI/6019-6). Research Triangle Park, NC: Research Triangle Institute.
- Cleary, P.D. (1987). Gender differences in stress-related disorders. In R.C. Barnett, L. Biener, & G.K. Baruch (Eds.), Gender and stress (pp. 399-472). New York: Free Press.
- Deal, S.R., & Gavalier, J.S. (1994). Are women more susceptible than men to alcohol-induced cirrhosis? Alcohol Health and Research World, 18(3), 189-191.

- Folkman, S., & Lazarus, R.S. (1984). Stress, appraisal, and coping. New York: Springer.
- Frankenhaeuser, M. (1991). The psychophysiology of workload, stress, and health: Comparison between the sexes. Annals of Behavioral Medicine, 13(4), 197-204.
- Gijsbers Van Wijk, C.M.T., et al. (1991). Symptom sensitivity and sex differences in physical morbidity: A review of health surveys in the United States and the Netherlands. Women and Health, 17(1), 91-124.
- Hibbard, J.H. (1983). Sex differences in health and illness orientation. Quarterly of Community Health Education, 4(2), 95-104.
- Hobfoll, S.E. (1989). Conservation of resources: A new attempt at conceptualizing stress. American Psychologist, 44, 513-524.
- Keppel, G., & Zedeck, S. (1989). Data analysis for research designs. New York: W.H. Freeman.
- Lemmens, PH. (1994). The alcohol content of self-report and "standard" drinks. Addiction, 89(5), 593-601.
- Marmot, M.G., Elliott, P., Shipley, M.J., Dyer, A.R., Ueshima, H., Beevers, D.G., Stamler, R., Kasteloot, H., Rose, G., & Stamler, J. (1994). Alcohol and blood pressure: The INTERSALT study. British Medical Journal, 308(6939), 1263-1267.
- Martin, J.K., Blum, T.C., Beach, S.R. & Roman, P.M. (1996). Subclinical depression and performance at work. Social Psychiatry and Psychiatric Epidemiology, 31, 3-9.
- McEwen, B. (1998). Protective and damaging effects of stress mediators. New England Journal of Medicine, 338(3), 171-179.

McGlohn, S.E., King, R.E., Butler, J.W., & Retzlaff, P.D. (1997). Female United States Air Force (USAF) pilots: Themes, challenges, and possible solutions Aviation, Space, and Environmental Medicine, 68(2), 132-138.

Miller, S.M., & Kirsch, N. (1987). Sex differences in cognitive coping with stress. In R.C. Barnett, L. Biener, & G.K. Baruch (Eds.) Gender and stress (pp. 399-472). New York: Free Press.

Nelson, D.L., & Sutton, C.D. (1990). Chronic work stress and coping: A longitudinal study and suggested new directions Academy of Management Journal, 33(4), 859-869.

Norwood, A.E., Ursano, R.J., & Gabbay, F.H. (1997). Health effects of the stressors of extreme environments on military women. Military Medicine, 162(10), 643-648.

Orasanu, J.M., & Backer, P. (1996). Stress and military performance. In J.E. Driskell, E.E. Salas, et al. (Eds.), Stress and human performance (pp. ____ - ____). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Roth, S., & Cohen, L.J. (1986). Approach, avoidance, and coping with stress. American Psychologist, 41, 813-819.

Shah, B.V., Barnwell, B.V., & Bieler, G.S. (1995). SUDAAN user's manual: Software for the analysis of correlated data: Release 6.04. Research Triangle Park, NC: Research Triangle Institute.

Sherrill, J.T., Anderson, B., Frank, E., et al. (1997). Is life stress more likely to provoke depressive episodes in women than in men? Depression and Anxiety, 6, 95-105.

Sobell, L.C., Cunningham, J.A., & Sobell, M.B. (1996). Recovery from alcohol problems with and without treatment: Prevalence in two population surveys. American Journal of Public Health, 86, 966-972.

Srivastava, A.K., & Krishna, A. (1991). A test of inverted "U"-hypothesis of stress-performance relationship in the industrial context. Psychological Studies, 36(1), __-__.

Verbrugge, L.M. (1990). The twain meet: Empirical explanations of sex differences in health and mortality. In M.G. Ory & H.R. Warner (Eds.), Gender, health and longevity (pp. 159-199). New Yorker: Springer

Weissman, M.M., Bland, R.C., Canilno, G.J., Faravelli, C., Greenwald, S., Hwu, H.G., Joyce, P.R., Karam, E.G., Lee, C.K., Lellouch, J., Lepine, J.P., Newman, S.C., Rubio-Stipec, M., Wells, J.E., Wickramaratne, P.J., Wittchen, H.U., & Yeh, E.K. (1996). Cross-national epidemiology of major depression and bipolar disorder. Journal of the American Medical Association, 276, 293-299.

WHO Brief Intervention Study Group. (1996). A cross-national trial of brief interventions with heavy drinkers. American Journal of Public Health, 86, 948-955.

Wickramaratne, P.J., Weissman, M.M., Leaf, P.J., & Holford, T.R. (1989). Age, period and cohort effects on the risk of major depression: Results from five United States communities. Journal of Clinical Epidemiology, 42, 333-343.

Wilsnack S.C., Wilsnack R.W., & Hiller-Sturmhofel S. (1994). How women drink: Epidemiology of women's drinking and problem drinking. Alcohol Health and Research World, 18(3), 173-181.

Table 1—Sociodemographic Characteristics of U.S. Military Women and Men

Characteristic	Women			Men		
	Unweighted <u>N</u>	Weighted <u>N</u>	%	Unweighted <u>N</u>	Weighted <u>N</u>	%
Age (years)						
≤ 20	393	25 022	15.2	1212	131,399	11.3
21-25	860	53 514	32.5	2843	370,193	31.9
26-34	910	53 553	32.5	3497	385,972	33.3
≥35	811	32 810	19.9	5667	272,933	23.5
Race/ethnicity						
White	1813	98 619	59.8	9308	798 567	68.8
African American	704	42 241	25.6	1967	185 415	16.0
Hispanic	258	12 979	7.9	1078	100 202	8.6
Other	199	11 061	6.7	866	76 313	6.6

(continued)

Table 1 (continued)

Characteristic	Women			Men		
	Unweighted N	Weighted N	%	Unweighted N	Weighted N	%
Education						
≤ H.S. graduate	796	45 543	27.6	4308	441 710	38.1
Trade/technical graduate						
or some college	1424	83 675	50.7	5611	498 090	42.9
≥ College graduate	754	35 682	21.6	3300	220 697	19.0
Service						
Army	686	55 491	33.7	2952	366 756	31.6
Navy	864	42 994	26.1	3401	339 023	29.2
Marine Corps	576	6741	4.1	3384	138 578	11.9
Air Force	848	59 674	36.2	3482	316 140	27.2

(continued)

Table 1 (continued)

Characteristic	Women			Men		
	Unweighted N	Weighted N	%	Unweighted N	Weighted N	%
Job status						
Enlisted	2355	137 777	83.6	10 176	980 687	84.5
Officer	619	27 122	16.4	3035	179 530	15.5
Marital status						
Married	1581	84 154	51.0	9099	714 796	61.6
Unmarried	1393	80 745	49.0	4120	445 700	38.4
Total	2974		100.0	13 219		100.0

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995.

Table 2—Levels of Perceived Stress Among U.S. Military Personnel

Type of stress/level of stress	Women	Men	Total DoD
Stress at work			
Great deal	17.6	15.7	16.0
Fairly large amount	22.5	23.4	23.3
Some	30.7	29.7	29.8
A little	22.7	20.6	20.9
None	6.5	10.5	10.0
Stress in family			
Great deal	13.4	8.8	9.3
Fairly large amount	15.9	12.7	13.1
Some	27.3	27.1	27.2
A little	26.9	30.6	30.1
None	16.6	20.8	20.3
Stress being a woman in military			
Great deal	16.2	NA	16.2
Fairly large amount	16.8	NA	16.8
Some	35.4	NA	35.4
A little	18.4	NA	18.4
None	13.2	NA	13.2

Note: Table entries are column percentages of personnel who reported the indicated levels of stress in the past 12 months. NA = Not applicable.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995.

Table 3—Factors Associated with Lower Functioning at Work: U.S. Military Personnel, 1995

Independent variables ¹	Women			Men		
	Adjusted		p	Adjusted		p
	OR	95% CI		OR	95% CI	
Work-related stressors	1.28	1.17, 1.40	<.0001	1.15	1.08, 1.21	<.0001
Family-related stressors	1.01	0.91, 1.12	ns	1.19	1.14, 1.25	<.0001
Financial-related stressors	1.04	0.94, 1.15	ns	0.95	0.90, 1.01	ns
Health-related stressors	1.31	1.20, 1.43	<.0001	1.30	1.23, 1.37	<.0001
Symptoms of depression	1.32	1.07, 1.62	<.01	1.30	1.19, 1.43	<.0001
Positive coping measures	1.01	0.91, 1.11	ns	1.03	0.98, 1.08	ns
Negative coping measures	1.09	0.94, 1.26	ns	1.15	1.08, 1.21	<.0001
Drinking level ²						
Heavy vs. abstainer	0.97	0.80, 1.18	ns	1.18	1.02, 1.36	<.01
Heavy vs. infrequent/light	1.08	0.84, 1.39	ns	1.21	1.05, 1.39	<.01
Heavy vs. moderate	0.90	0.66, 1.23	ns	1.08	0.95, 1.22	ns
Heavy vs. moderate/heavy	1.07	0.72, 1.58	ns	0.97	0.83, 1.13	ns

See notes at end of table.

(continued)

Table 3 (continued)

Independent variables ¹	Women			Men		
	Adjusted		p	Adjusted		p
	OR	95% CI		OR	95% CI	
Illicit drug use in past year vs.						
no use in past year	1.31	0.86, 1.97	ns	1.35	1.12, 1.64	<.01
Enlisted vs. officer status	0.92	0.69, 1.23	ns	0.86	0.71, 1.04	ns
Unmarried vs. married	0.97	0.82, 1.14	ns	1.06	0.93, 1.21	ns
Race/ethnicity						
African American vs. white	0.89	0.73, 1.08	ns	0.88	0.72, 1.07	ns
Hispanic vs. white	0.67	0.48, 0.94	<.05	0.79	0.69, 0.90	<.01
Other vs. white	0.77	0.52, 1.15	ns	0.74	0.69, 0.88	<.01
Education						
≤ H.S. vs. college grad.	1.13	0.79, 1.60	ns	1.05	0.87, 1.25	ns
> H.S. vs. college grad.	1.04	0.78, 1.40	ns	1.16	0.96, 1.39	ns
See notes at end of table.						

(continued)

Table 3 (continued)

Independent variables ¹	Women			Men		
	Adjusted	Adjusted	<i>p</i>	Adjusted	Adjusted	<i>p</i>
	OR	95% CI		OR	95% CI	
Age (years)						
≤ 20 vs. ≥ 35 years old	1.16	0.78, 1.73	ns	1.31	1.10, 1.55	<.001
21-25 vs. ≥ 35 years old	1.37	1.10, 1.72	<.01	1.32	1.15, 1.53	<.001
26-34 vs. ≥ 35 years old	1.06	0.86, 1.31	ns	1.28	1.15, 1.42	<.001

ns = not statistically significant at $p \leq .05$.

¹Continuous variables standardized.

²Details of drinking variable constructed presented on *p*.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995.

Running head: DEPLOYMENT AND SUBSTANCE USE

Deployment and Substance Use Among Military Women and Men

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Abstract

Relatively little is known about the effects of deployment in noncombat situations on the substance use of military personnel. However, substance use during deployment poses a number of implications for military readiness and the safety of personnel. This study examined whether substance use was associated with deployment in the past 30 days among military women and men using data from the 1995 DoD Survey of Health Related Behaviors Among Military Personnel. Regression models, controlling for sociodemographic factors, showed higher rates of heavy alcohol use among deployed women and men than among those not deployed. This relationship was particularly notable for women: Those deployed were almost three times more likely than their nondeployed counterparts to report heavy alcohol use. Among military men, deployment also was found to be associated with higher rates of cigarette use, nonheavy alcohol use, and alcohol dependence. Implications of these findings are discussed along with directions for future research.

Deployment and Substance Use Among Military Women and Men

Military life requires personnel to function in a wide variety of environments that range from performing routine job assignments at large or small military installations to working in field conditions to being deployed to unfamiliar surroundings and perhaps stressful battle settings. Although deployments are a regular part of military life, they can vary greatly in terms of the experience they present for personnel. For example, they vary in duration, location, military support, living accommodations and comforts, and stress of the situation.

Many aspects of the deployment experience have not been well studied, including its effects on substance use. Substance use is of concern in both deployed and nondeployed settings because it can have negative effects on health, social life, family relationships, and work performance for military personnel. However, substance use during deployment poses a number of important implications beyond these more global concerns. First, substance use can potentially affect both military readiness and the safety of personnel during deployment. Second, if increases in substance use are associated with deployment, this relationship could have long-term implications for substance use among military personnel. A number of factors related to deployment may influence patterns of substance use, including changes in social support, perceptions and experiences of stress, access to substances, normative attitudes regarding substance use, and supervision. For example, increases in stress may result in greater substance use, or changes in access to substances (either an increase or decrease) could result in corresponding changes in use.

Prior research on the relationship between deployed situations and substance use has focused almost exclusively on specific combat situations, namely, the Vietnam War and the Persian Gulf War, and on men in the military (e.g., Bray et al., 1992; Furgas, Meyer, & Cohen, 1996; Labbate & Snow, 1992; Ritter, Clayton, & Voss, 1985; Robins, Helzer, & Davis, 1975;

Rothberg, Harris, Jellen, & Pickle, 1985; Rothberg, Koshes, Shanahan, & Christman, 1994). In a hallmark study, Robins et al. (1975) examined rates of substance use before, during, and after service in Vietnam among a random sample of 470 Vietnam Army veterans (including both enlistees and draftees) 8 to 12 months after their return to the United States in September 1971. Preservice rates were found to be low and similar to national rates (e.g., 11% had tried a narcotic at least once, but fewer than 1% reported using a narcotic more than 25 times). However, approximately 20% of the sample reported having used narcotics on a weekly basis for 6 months or more during their service in Vietnam, and 20% also were considered to be addicted based on reported symptoms of dependence. Rates of substance use after returning to the United States showed a decrease to preservice levels for overall use but slight elevations, compared to baseline rates, for heavy use.

More recent studies have been based on experiences during the Persian Gulf War. Rothberg et al. (1994) compared the mental health and drug and alcohol service utilization rates among six U.S. Army units deployed to Southwest Asia during Desert Storm to 11 units not deployed. Their findings showed somewhat higher rates of substance use both before and after (not significant) deployment for 150 soldiers in deployed units compared to the 150 in nondeployed units. However, the units also differed in demographic characteristics such that deployed personnel were less likely to be white, were younger, and were more likely to be in the enlisted ranks. The small sample size precluded analyses to control for these demographic differences. A second study by Labbate and Snow (1992), although also limited by the small sample size of 53 soldiers, found that deployed members of an Army unit reported using alcohol to alleviate nightmares or to aid sleep.

Three larger studies of substance use during Operation Desert Storm include the Department of Defense (DoD) 1992 Worldwide Survey of Substance Abuse and Health

Behaviors Among Military Personnel (Bray et al., 1992), a study by the Iowa Persian Gulf Study Group (1997), and a study of tobacco use among Naval personnel (Forgas et al., 1996). The 1992 Worldwide Survey retrospectively assessed substance use during Desert Storm relative to use prior to deployment among 3,438 military personnel enrolled as part of a larger study based on a probability sample of all active-duty military personnel in 1992 (Bray et al., 1992). Some 45.2% of deployed military personnel reported that their use of alcohol decreased during Desert Storm, a finding that was consistent with the cultural prohibitions in the region against alcohol. However, approximately 12% reported that their drinking stayed the same, and almost 8% reported that their drinking increased. Interestingly, the higher rates of increase in drinking were found among the Navy and Air Force personnel (11.7% and 12.0%, respectively, vs. 4.1% for Army and 7.9% for Marine Corps); the Navy and Air Force personnel also were more likely to be stationed away from the front lines and perhaps able to obtain access to alcohol more readily. Smoking behavior showed a different pattern, however. Only slightly more than 4% reported a decrease in smoking, almost 15% reported smoking about the same amount, 15% reported smoking more during deployment, and almost 8% either started smoking or resumed smoking. Rates of illicit drug use were much lower than rates for either alcohol or cigarette use; only about 5% had used illicit drugs either before or during Desert Storm. Approximately 1% reported that their drug use increased, almost 1% said their use remained the same, and 2.5% reported a decrease in use.

The Iowa Persian Gulf Study Group (1997) examined rates of illness and health status in a stratified random sample of 3,695 military personnel on active duty (regular or National Guard/Reserve) at some time between August 1990 and July 1991. In analyses that controlled for the stratification variables of age, sex, race, rank, and service branch, Gulf War Veterans who served in the Persian Gulf theater (regular military personnel and National Guard/Reserve)

were found to have significantly higher rates of alcohol abuse compared to those who were on active duty (and may have been deployed) but did not serve in the Persian Gulf theater.

Finally, Forgas et al. (1996) examined tobacco use among 1,915 Naval personnel deployed to Desert Storm. They found both increased use of smokeless tobacco and cigarettes among users and initiation of use among nonusers. For instance, 7% reported starting to smoke and 29% reported smoking more while in the Persian Gulf. Two other interesting findings from this study are that boredom and stress were the most frequently reported reasons for smoking and that the ship store was the place most frequently reported for obtaining cigarettes.

These findings reported in the literature suggest that rates and patterns of substance use among military personnel may change during combat and that stress, access, and cultural norms regarding substance use are all potential factors for influencing use during deployed situations. However, despite the important advances afforded by past studies, a number of gaps remain to be addressed. First, little is known about the relative proclivity of individuals to engage in substance use during deployed situations that do not include direct combat experience (e.g., peacekeeping missions). Second, even less is known about the effects of deployment on substance use among women, even though the number of military women is rising and women are playing increasingly important roles in the military and in deployments. Most of the research to date has concentrated either only on male military personnel, or on the military as a whole, ignoring any potential difference between males and females in the effects they were examining.

To address these gaps, the current study examines whether recently deployed military personnel are more likely to use substances than those not recently deployed. This study also has the added value of examining these relationships separately among women and men in an attempt to understand whether the effects of deployment on substance use differ between the two sexes.

Methods

Study Sample

Data for this study are drawn from the 1995 DoD Survey of Health Related Behaviors among Military Personnel (the 1995 DoD Survey). Details of the 1995 DoD Survey are described by Bray et al. (1995b). Given here is a synopsis of the methods relevant for the current study.

All active-duty military personnel—except recruits, service academy students, persons absent without official leave (AWOL), and persons who had a permanent change of station (PCS) at the time of data collection—were eligible to be included in the study. Sampling was based on a two-staged design. The first stage was comprised of military installations stratified by military service (Army, Navy, Air Force, Marines) and geographic region (within the 48 contiguous or continental United States [CONUS] and outside the continental United States [OCONUS]). The second-stage sampling involved sampling of personnel from the 59 military installations selected during the first stage. For this second stage, personnel were stratified based on sex (male, female) and military pay grade, with three levels among enlisted personnel (E1-E3, E4-E6, E7-E9) and three among officers, including warrant officers (W1-W3, O1-O3, O4-O10). Both women and officers were oversampled due to their smaller relative numbers. The 1995 DoD Survey's study sample was designed to be representative of all active-duty personnel in the military, and data were weighted to reflect the population proportions, taking into account the sampling design.

Data were collected via anonymous questionnaires that were self-administered during group sessions conducted by two-person civilian field teams. These group sessions were held at each of the 59 selected military installations between April and August 1995 and accounted for about 90% of respondents. Eligible personnel who did not participate in group sessions (e.g.,

were on official leave, temporary duty assignments, sick) were mailed questionnaires to complete and return by mail. The study had a response rate of 70% for a total sample of 16,193. Analyses reported here are based on the 12,978 men and 2,948 women who had valid information about whether they had been deployed in the 30 days prior to the survey (98.3% of total sample).

Measures

The 1995 DoD Survey's questionnaire covered a range of topics relevant to health behaviors, including substance use, stress, exercise, high blood pressure, sexual behavior, and health attitudes. All domains for this study were measured via respondents' answers to items in the self-administered questionnaire.

Demographic Characteristics

A number of demographic factors were considered as potential control variables based on prior research that had shown these characteristics to be related to substance use among military personnel (Bray, Kroutil, & Marsden, 1995a; Bray et al., 1995b) and a hypothesized relationship that these same characteristics also might be related to having recently been deployed (e.g., age, pay grade). These characteristics included age grouped into the four categories (≤ 20 , 21-25, 26-34, ≥ 35 years); race/ethnicity (white, black, Hispanic, other); marital status (married, not married); education (high school or less, some college, college graduate or higher); branch of active military service (Army, Navy, Marine Corps, Air Force); and pay grade (enlisted, officer).

Deployment

Deployment status in the past 30 days was assessed via the following question: "During the past 30 days, how many full 24-hour days were you deployed at sea or in the field?" The

primary measure of deployment used in this study was a dichotomous variable that indicated any days versus no days deployed in the past 30 days.

Three other measures of deployment were created for analyses that examined potential causal mechanisms for relationships identified in the main analyses. First was a three-level variable specifying length of deployment in past 30 days: not deployed, deployed 2 weeks or less (1-14 days), and deployed more than 2 weeks (15-30 days). Second was a three-level variable assessing stress experienced during the past 12 months from being deployed at sea or in the field: not deployed, deployed with little or no stress, and deployed with "a fairly large amount" or "a great deal" of stress reported. The third variable, also with three levels, assessed recency of deployment: not deployed, deployed less recently (i.e., more than 1 week ago), and deployed more recently (i.e., within the past week).

Substance Use

Substance use was assessed for cigarette smoking, alcohol use, and illicit drug use. The time reference period for all three substances was the past 30 days to coincide with the time frame of the deployment question. Cigarette smoking during the past 30 days was defined as smoking at least 100 cigarettes during one's lifetime and having smoked in the past 30 days. Illicit drug use was based on reported use of any of the following drugs during the past 30 days: marijuana/hashish, cocaine, phencyclidine (PCP), lysergic acid diethylamide (LSD) or other hallucinogens, amphetamines or other stimulants, tranquilizers or other depressants, barbiturates or other sedatives, heroin or other opiates, analgesics or other narcotics, inhalants, and "designer" drugs. Both cigarette smoking and illicit drug use were operationalized as dichotomous variables for any use versus no use during the past 30 days. Alcohol use, however, was developed as a three-level variable for use in the past 30 days: no use (abstinent), nonheavy use, and heavy use, with heavy use defined to be consumption of five or more drinks

per typical drinking occasion at least once a week for both women and men. For alcohol, a measure of dependence was used in addition to the use measure described above. This dependence measure was based on the sum of reported occurrences during the past 12 months across the following four symptoms: withdrawal symptoms, blackouts, inability to stop drinking before becoming drunk, and morning drinking. Respondents who reported 48 or more occurrences were considered to be dependent. This measure was based on the Rand Air Force study definition (Polich & Orvis, 1979) although it does not directly coincide with the definition of dependence in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association [APA], 1994).

Statistical Methods

All analyses were performed using SURvey DATA ANalysis (SUDAAN) software for the statistical analysis of correlated data to take into account the complex survey design (Shah, Barnwell, & Bieler, 1996). In addition, analysis weights that take into account the sampling scheme were used. In presentation of the results, sample sizes are reported as unweighted counts, but statistics (including percentages) are based on weighted data.

Initial descriptive analyses were employed to examine the prevalence of substance use among deployed women and men compared to their nondeployed counterparts. In addition, the relationship of deployment to demographic characteristics was assessed because these factors have been shown to be related to substance use among military personnel and were considered to be potential mediating variables in the current study. Statistical significance of relationships was assessed via chi-squared tests for association (analogous to Pearson chi-squared tests) (see Shah et al., 1996).

To examine the relationship between deployment and substance use, while holding constant the effects of demographic characteristics, logistic and multinomial logit regression

models were employed. Logistic regression models were used for the dichotomous outcomes: alcohol dependence, cigarette use, and illicit drug use. Multinomial logit models were used for the three-level measure of alcohol use. The multinomial model is based on a generalization of the logistic regression model that allows for categorical outcomes that have more than two response categories. In the multinomial model, a separate intercept and set of slope parameters are calculated for each of the $J-1$ nonredundant categories, where J is the number of categories for the response variable (Agresti, 1990). Specifically for alcohol use, both levels of drinking (i.e., nonheavy use and heavy use) were considered "cases" compared to the noncase category of abstainers. All regression analyses were conducted separately for women and men.

In the final step, parallel regression models were run to examine the relationship of substance use with stress during deployment, length of deployment, and recency of deployment. These analyses served as an initial attempt to understand factors related to deployment that might affect the observed relationships and to try to sort out, within a cross-sectional framework, whether the observed relationships are due to changes in use during deployment, after deployment, or both. It was hypothesized that the relationship between substance use and deployment would be strongest among those who had experienced stress related to deployment and who had been deployed for more days during the past 30-day period. Recency of deployment was included to examine whether the relationship between deployment and substance use would attenuate over time.

Results

Sociodemographic and service-related characteristics are presented in Table 1 for military women and men by deployment status. As shown, the majority of both women and men were between the ages of 21 and 34, white, married, had at least some college education, and

were enlisted. Significant differences between deployed and nondeployed personnel were found for both women and men for all characteristics with two exceptions. First, the relative percentages of enlisted personnel and officers were not significantly different for those deployed compared to those not deployed among either women or men. Second, the distribution of racial/ethnic categories was not significantly different for men, but it was significantly different for women. Compared to nondeployed women, a smaller percentage of deployed women were white (53.6% vs. 60.8%) and a greater percentage were Hispanic (13.3% vs. 7.2%).

INSERT TABLE 1 HERE

In general, however, the patterns were similar for both women and men. Those deployed tended to be younger (especially those aged 35 or younger), less well-educated (i.e., had a high school education or less), and unmarried relative to their nondeployed counterparts. For example, 47.2% of the nondeployed women were unmarried, compared to 61.8% of the deployed women. The pattern for men was the same although not as dramatic and also was statistically significant: 36.1% of nondeployed men were unmarried compared to 43.7% of deployed men. Finally, deployed women were most likely to be in the Army relative to those who had not been deployed, and deployed men were most likely to be in the Army or Navy.

Table 2 presents descriptive findings on substance use rates in the past 30 days for women and men by deployment status. Deployed women showed significantly higher rates of heavy alcohol use and alcohol dependence than did nondeployed women, but the groups showed no differences for cigarette use or illicit drug use. Deployed men showed significantly higher rates of smoking, heavy alcohol use, alcohol dependence, and illicit drug use than did nondeployed men. Rates of nonheavy alcohol use were between 61.4% and 63.6% across women and men in both the deployed and nondeployed groups. However, for both women and men, a smaller percentage of deployed personnel reported abstaining from alcohol (25.8% vs.

32.2% for women and 14.6% vs. 21.6% for men). The consistency of rates of nonheavy alcohol use suggests that differences are likely to be the result of some abstainers initiating use of alcohol during deployments at moderate levels and a proportion of moderate drinkers starting to drink heavily.

INSERT TABLE 2 HERE

Descriptive analyses were followed by logistic and multinomial logit regression analyses. Results of the final regression models, which controlled for age, race/ethnicity, education, marital status, branch of service, and pay grade, are presented in Table 3. In general, regression analysis results paralleled the bivariate findings presented in Table 2. Among women, there was a strong relationship between deployment and heavy alcohol use. The odds of heavy alcohol use were 2.84 times higher among deployed women than among those not deployed. However, after controlling for demographic factors, deployment was no longer significantly related to alcohol dependence. Among men, once demographic factors were controlled, deployment still showed a positive significant association with cigarette use, alcohol use, and alcohol dependence, but not with illicit drug use. The odds of engaging in the first three behaviors ranged from 1.30 to 1.51 times higher among deployed men than among nondeployed men.

INSERT TABLE 3 HERE

To shed light on underlying mechanisms, additional analyses examined the relationship between deployment and substance use, taking into account reported stress during deployment, length of deployment, and recency of deployment in the past 30 days. Overall, 24.9% of deployed women and 30.7% of deployed men reported experiencing stress during deployment; 29.7% of deployed women and 43.4% of deployed men had been deployed for more than 2 weeks during the past 30 days; and 34.2% of deployed women and 41.6% of deployed men had been deployed recently, namely within the past week (data not shown in table).

Results of logistic and multinomial logit regression analyses that examined the relationship between these additional deployment factors and substance use are shown in Table 4 for women and Table 5 for men. All models controlled for age, race/ethnicity, education, marital status, branch of service, and pay grade. Overall, the results from these models are similar to those presented in Table 3 for the relationships between deployment status and substance use. Deployment was positively associated only with heavy alcohol use for military women, but with cigarette use and heavy and nonheavy alcohol use for military men.

INSERT TABLES 4 AND 5 HERE

More specifically, among military women (Table 4), there are three noteworthy patterns. First, heavy alcohol use was significantly associated with less recent deployment (i.e., more than 1 week ago) but not with more recent deployment (i.e., within the past week). The odds of heavy drinking were 3.30 times higher among women deployed more than a week ago compared to those not deployed. Second, heavy alcohol use was related to length of deployment. Both levels of deployment showed significant differences from those who were not deployed, but the point estimates were higher among women who had been deployed for more days. Women who were deployed for more than 2 weeks had 4.59 times the odds of heavy drinking compared to those not deployed, and women deployed for 2 weeks or less in the past 30 days had 2.14 times the odds of heavy drinking compared to those not deployed. Third, similar to length of deployment, stress during deployment also showed significant relationships across levels of deployment. Women who reported stress during deployment had 3.56 times the odds of heavy alcohol use than those not deployed, and deployed women who did not report experiencing stress had 2.64 times the odds of heavy alcohol use than did those not deployed. These findings indicate that although length of deployment and stress during deployment

partially account for the observed relationships between heavy drinking and deployment, they are not sufficient explanations. Other aspects of deployment need to be taken into account.

Among military men (Table 5), the relationships between deployment and substance use also were significant across both of the deployed levels of recency, length, and stress for cigarette smoking, nonheavy alcohol use, and heavy alcohol use. As noted for women, there was a pattern for the odds ratios for heavy alcohol use and nonheavy use to be higher among men who were deployed more recently, for longer periods, and who reported stress during deployment. This pattern was less consistent for cigarette smoking. Significant odds ratios ranged from 1.24 to 1.43.

Discussion

This paper examined relationships between deployment and substance use (cigarette smoking, alcohol use, alcohol dependence, illicit drug use) among military women and men. Results showed that even after controlling for sociodemographic differences, military personnel who were deployed were consistently more likely to show higher rates of substance use than were those who were not deployed, although findings for specific substances were different for women and men. More specifically, among military women deployment was associated with higher rates of heavy alcohol use only, whereas for men deployment was associated with higher rates of cigarette smoking, alcohol dependence, nonheavy alcohol use, and heavy alcohol use. The finding of increased heavy drinking among deployed military women was surprising for two reasons: (a) heavy drinking is atypical behavior for military women (i.e., rates of heavy drinking are much lower among military women than among military men [Bray et al., 1995b]) and (b) the relationship was strong (i.e., the odds of heavy drinking were nearly three times higher among deployed than nondeployed women).

Additional analyses to understand the mechanisms by which deployment may be related to substance use focused on reported stress experienced during deployment and the length and recency of deployment. Consistent with hypotheses, results suggested that the relationship between deployment and substance use may be exacerbated, or be stronger, among those who experience stress during deployment and those deployed for longer periods. Recency of deployment was included to determine whether the relationship between deployment and substance use would attenuate over time; findings suggested that in general they did not. Although findings were generally consistent with expectations, significant relationships also occurred for deployed persons without stress and for those deployed for shorter periods. These latter findings indicate that although stress during deployment and length of deployment partially explain the substance use–deployment relationship, they are not sufficient explanations. Other important factors that we did not measure mediate the phenomenon.

Overall, results from the current study that examined substance use in general deployed situations are consistent with findings in the literature that pertain specifically to combat. Rates of use of cigarettes, alcohol, and illicit drugs have all been shown to be higher among those in combat compared to those not in combat or to be elevated during time of combat (Iowa Persian Gulf Study Group, 1997; Robins et al., 1975).

The finding of increased substance use, particularly heavy alcohol use among both military women and men during deployment, has potential negative implications for readiness of the force. Heavy drinking was reported by 24% of deployed men and 12% of deployed women (Table 2), substantial percentages that could have negative effects on unit functioning and the potential for work-related injuries. Alcohol use, and especially heavy alcohol use, can negatively influence capabilities of decisionmaking, equipment handling, and response time. Of course, the extent of the problems would depend in part on the military jobs and responsibilities of heavy

drinkers and the times and context under which the drinking occurs relative to mission assignments. For example, if drinking occurs in the evenings following duty assignments during a training deployment, it may be less serious than if it occurs during a battlefield or peacekeeping mission. But even "off-duty" drinking is problematic because alcohol effects can carry over beyond intended periods and impair judgment and mental alertness while performing duties. Thus, the increase of heavy drinking regardless of the context appears to increase the risk of reduced readiness of the force. In light of data from prior studies suggesting that access and stress may both be implicated in increased substance use (Forgas et al., 1996; Labbate & Snow, 1992), attention also could be directed to more effective approaches for controlling both during deployments.

The findings from this study must be considered in light of several limitations. First, this study relied on cross-sectional data and thus was not able to assess directly changes in substance use during and after deployment relative to a respondent's baseline levels (i.e., predeployment) of substance use. Second, some of the measures used different time periods. For example, the question that tapped deployment stress used a 12-month time frame, whereas substance use and deployment questions were based on a past 30-day period. Therefore, it is possible that reports of stress experienced during deployment may not be related directly to the deployments tapped in this interview. Third, a global measure of deployment was used that did not distinguish among different types of deployment, such as simulated battlefield conditions, peacekeeping missions, or training exercises. To the extent that different types of deployments may interact with substance use, the findings reported here may need to be qualified. Fourth, because the substance use data were based on self-reports, substance use estimates may be conservative. However, to guard against underreporting, rigorous methodological procedures were followed consistent with those that have been identified by Harrison (1995) and by

Johnston and O'Malley (1985) to encourage honest reporting (e.g., respondents were anonymous, questionnaires were answered privately, civilian teams collected the data and promised that it would not be shown to military personnel at the installation).

Despite these limitations, the current study is one of the first to examine substance use during peacetime deployments and suggests that use, especially of alcohol, may increase during deployment situations that are not specifically combat related. These findings suggest that military substance use prevention and early intervention programs would benefit from including components that deal specifically with substance use during deployed situations. For instance, if the results of Forgas et al. (1996) are correct in that relief of stress and boredom are two common reasons for smoking, then concern may need to be directed to a consideration of what will replace cigarettes as smoking is banned on more ships and submarines. In addition, the differences between women and men found in this study suggest that more attention should be directed to issues of heavy alcohol use for military women, but to both cigarette use and alcohol use for military men.

Although the current study provides important insights about substance use during deployment, it also points to the need for additional research to better understand the nature and patterns of this use and the underlying causal mechanisms. It is important, for example, to examine more directly substance use rates and patterns before, during, and after deployment and to understand the role of such factors as changes in norms and attitudes toward use during these periods. Similarly, it will be useful to examine and clarify differences in the nature and types of deployments (e.g., training and qualifying exercises, battlefield simulations, peacekeeping missions) and to determine whether these affect the relationship with substance use.

References

- Agresti, A. (1990). Categorical data analysis. New York: John Wiley & Sons.
- American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders (4th ed.). Washington, DC: Author.
- Bray, R. M., Kroutil, L. A., Luckey, J. W., Wheelless, S. C., Iannacchione, V. G., Anderson, D. W., Marsden, M. E., & Duntelman, G. H. (1992). 1992 Worldwide Survey of Substance Abuse and Health Behaviors Among Military Personnel. Research Triangle Park, NC: Research Triangle Institute.
- Bray, R. M., Kroutil, L. A., & Marsden, M. E. (1995a). Trends in alcohol, illicit drug, and cigarette use among U.S. military personnel: 1980-1992. Armed Forces & Society, 21, 271-293.
- Bray, R. M., Kroutil, L. A., Wheelless, S. C., Marsden, M. E., Bailey, S. L., Fairbank, J. A., & Harford, T. C. (1995b). 1995 Department of Defense Survey of Health Related Behaviors Among Military Personnel (RTI/6019-6). Research Triangle Park, NC: Research Triangle Institute.
- Forgas, L. B., Meyer, D. M., & Cohen, M. E. (1996). Tobacco use habits of naval personnel during Desert Storm. Military Medicine, 161, 165-168.
- Harrison, L. D. (1995). The validity of self-reported data on drug use. Journal of Drug Issues, 25, 91-111.
- Iowa Persian Gulf Study Group. (1997). Self-reported illness and health status among Gulf War veterans: A population-based study. Journal of the American Medical Association, 277, 238-245.
- Johnston, L. D., & O'Malley, P. M. (1985). Issues of validity and population coverage in student surveys of drug use. In B. A. Rouse, N. J. Kozel, & L. G. Richards (Eds.), Self-report

methods of estimating drug use: Meeting current challenges to validity (NIDA Research Monograph No. 57, DHHS Publication No. ADM 85-1402, pp. 31-54). Rockville, MD: National Institute on Drug Abuse.

Labbate, L. A., & Snow, M. P. (1992). Posttraumatic stress symptoms among soldiers exposed to combat in the Persian Gulf. Hospital and Community Psychiatry, 43, 831-833.

Polich, J. M., & Orvis, B. R. (1979). Alcohol problems: Patterns and prevalence in the U.S. Air Force. Santa Monica, CA: Rand Corporation.

Ritter, C., Clayton, R. R., & Voss, H. L. (1985). Vietnam military service and marijuana use. American Journal of Drug and Alcohol Abuse, 11, 119-130.

Robins, L. N., Helzer, J. E., & Davis, D. H. (1975). Narcotic use in Southeast Asia and afterward: An interview study of 898 Vietnam returnees. Archives of General Psychiatry, 32, 955-961.

Rothberg, J. M., Harris, J. J., Jellen, L. K., & Pickle, R. (1985). Illness and health of the U.S. battalion in the Sinai MFO deployment. Armed Forces & Society, 11, 413-426.

Rothberg, J. M., Koshes, R. J., Shanahan, J., & Christman, J. (1994). Desert Shield deployment and social problems on a U.S. Army combat support post. Military Medicine, 159, 246-248.

Shah, B. V., Barnwell, B. G., & Bieler, G. S. (1996). SUDAAN user's manual: Release 7.0. Research Triangle Park, NC: Research Triangle Institute.

TABLE 1

Sociodemographic and Military Service Characteristics of Military Women and Men,
by Deployment Status

<u>Characteristics</u>		<u>Women</u>		<u>Men</u>	
		<u>Not Deployed</u> (n=2,665)	<u>Deployed</u> (n=283)	<u>Not Deployed</u> (n=9,709)	<u>Deployed</u> (n=3,269)
Age (years)	≤20	14.3	20.6	9.8	14.6
	21-25	31.7	37.7	29.2	37.7
	26-34	32.8	29.7	34.4	31.1
	≥35	21.1	12.0	26.6	16.6
Race/ethnicity	White	60.8	53.6	68.4	71.2
	Black	25.5	25.6	16.3	14.2
	Hispanic	7.2	13.3	8.8	8.0
	Other	6.6	7.4	6.5	6.6
Marital status	Not married	47.2	61.8	36.1	43.7
	Married	52.8	38.2	63.9	56.3
Education	≤ High school	26.4	35.4	34.2	45.9
	Some college	51.1	47.3	45.6	37.0
	≥ College	22.5	17.3	20.2	17.1
Service	Army	30.1	58.6	27.7	41.3
	Navy	26.0	26.2	26.3	35.0
	Marine Corps	4.2	3.3	11.6	12.9
	Air Force	39.7	11.9	34.4	10.8
Pay grade	Enlisted	82.8	87.3	83.7	85.6
	Officer	17.2	12.7	16.3	14.4

Note: Entries are column percentages. Some cells may not sum to 100% due to rounding.

Source: 1995 DoD Survey of Health Related Behaviors Among Military Personnel.

TABLE 2

Rates of Past Month Substance Use for Military Women and Men, by Deployment Status

<u>Substance</u>		<u>Women</u>			<u>Men</u>		
		<u>Not Deployed</u>	<u>Deployed</u>	<u>p- Value</u>	<u>Not Deployed</u>	<u>Deployed</u>	<u>p- Value</u>
Cigarette smoking	No use	74.4	70.4	n.s.	70.0	61.3	≤.001
	Any use	25.6	29.6		30.0	38.7	
Alcohol	No Use	32.2	25.8	≤.05	21.6	14.6	≤.001
	Nonheavy use	63.6	61.9		61.7	61.4	
	Heavy use	4.3	12.3		16.7	24.0	
Alcohol dependence	No	98.1	95.3	≤.05	95.1	90.7	≤.001
	Yes	1.9	4.7		4.9	9.3	
Illicit drug	No use	97.6	96.5	n.s.	97.5	95.6	≤.05
	Any use	1.4	3.4		2.5	4.4	

Note: Entries are column percentages. Some cells may not sum to 100% due to rounding.

Source: 1995 DoD Survey of Health Related Behaviors Among Military Personnel.

TABLE 3

Association of Deployment with Substance Use for Military Women and Men

<u>Substance Use</u>	<u>Women</u>		<u>Men</u>	
	<u>O.R.</u>	<u>(95% C.I.)</u>	<u>O.R.</u>	<u>(95% C.I.)</u>
Cigarette smoking				
Not deployed	1.00		1.00	
Deployed	1.12	(0.86, 1.45)	1.30	(1.14, 1.48)
Nonheavy alcohol use ^a				
Not deployed	1.00		1.00	
Deployed	1.22	(0.88, 1.69)	1.38	(1.18, 1.61)
Heavy alcohol use ^a				
Not deployed	1.00		1.00	
Deployed	2.84	(1.53, 5.28)	1.51	(1.23, 1.86)
Alcohol dependence				
Not deployed	1.00		1.00	
Deployed	1.87	(0.88, 3.96)	1.50	(1.19, 1.90)
Illicit drug use				
Not deployed	1.00		1.00	
Deployed	1.18	(0.38, 3.67)	1.24	(0.77, 2.01)

Note: Models controlled for age, race/ethnicity, education, marital status, branch of service, and pay grade. Entries are odds ratios (O.R.).

^aNoncase status is abstinence.

Source: 1995 DoD Survey of Health Related Behaviors Among Military Personnel.

TABLE 4

Association of Recency, Length, and Stress During Deployment with Substance Use for Military Women

Substance Use Outcomes	Recency of Deployment			Length of Deployment			Stress During Deployment		
	Not Deployed	Deployed Less Recently	Deployed More Recently	Not Deployed	Deployed 2 Weeks or Less	Deployed More Than 2 Weeks	Not Deployed	Deployed, Not Stressed	Deployed and Stressed
	O.R.	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R.	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)
Cigarette smoking	1.00	1.31 (0.96, 1.79)	0.81 (0.52, 1.25)	1.00	1.00 (0.74, 1.33)	1.48 (0.87, 2.53)	1.00	1.15 (0.85, 1.56)	1.06 (0.59, 1.90)
Nonheavy alcohol use	1.00	1.37 (0.90, 2.09)	0.99 (0.66, 1.49)	1.00	1.28 (0.87, 1.86)	1.09 (0.67, 1.76)	1.00	1.13 (0.79, 1.63)	1.49 (0.60, 3.69)
Heavy alcohol use	1.00	3.30 (1.73, 6.30)	2.16 (0.81, 5.79)	1.00	2.14 (1.21, 3.80)	4.59 (1.64, 12.85)	1.00	2.64 (1.20, 5.80)	3.56 (1.72, 7.40)
Illicit drug use	1.00	0.85 (0.19, 3.78)	1.76 (0.54, 5.76)	1.00	0.98 (0.26, 3.78)	1.70 (0.41, 7.09)	1.00	1.05 (0.29, 3.77)	1.63 (0.25, 10.65)

Note: Entries are odds ratios (O.R.).Source: 1995 DoD Survey of Health Related Behaviors Among Military Personnel.

TABLE 5

Association of Recency, Length, and Stress During Deployment with Substance Use for Military Men

Substance Use Outcomes	Recency of Deployment			Length of Deployment			Stress During Deployment		
	Not Deployed	Deployed Less Recently	Deployed More Recently	Not Deployed	Deployed 2 Weeks or Less	Deployed More Than 2 weeks	Not Deployed	Deployed Stressed	Deployed and Stressed
	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)	O.R. (95% C.I.)
Cigarette smoking	1.00	1.25 (1.05, 1.50)	1.28 (1.18, 1.60)	1.00	1.31 (1.10, 1.55)	1.29 (1.11, 1.50)	1.00	1.24 (1.07, 1.43)	1.43 (1.20, 1.70)
Nonheavy alcohol use	1.00	1.29 (1.09, 1.53)	1.56 (1.28, 1.89)	1.00	1.30 (1.04, 1.64)	1.52 (1.27, 1.82)	1.00	1.39 (1.16, 1.67)	1.34 (1.08, 1.67)
Heavy alcohol use	1.00	1.44 (1.11, 1.86)	1.66 (1.26, 2.21)	1.00	1.45 (1.10, 1.90)	1.64 (1.29, 2.08)	1.00	1.41 (1.10, 1.80)	1.73 (1.32, 2.26)
Illicit drug use	1.00	1.45 (0.93, 2.18)	1.01 (0.48, 2.14)	1.00	1.33 (0.78, 2.30)	1.12 (0.53, 2.39)	1.00	1.09 (0.62, 1.93)	1.60 (0.98, 2.59)

Note: Entries are odds ratios (O.R.).Source: 1995 DoD Survey of Health Related Behaviors Among Military Personnel.

APPENDIX B
CONFERENCE PRESENTATIONS

Deployment and Substance Use Among Military Women and Men

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Paper presented at the 125th Annual Meeting of the American Public Health
Association at Indianapolis, Indiana; November 1997

Research Questions

- Are recently deployed military personnel more likely to report substance use than those who have not been deployed?
- Is there a different relationship between deployment and substance use for military women and men?

Rationale

- Negative effects of substance use on work performance, health, social life, family relationships
- Implications of substance use for military readiness and work related accidents
- Relatively little known about relationship between deployment and substance use - prior studies focused specifically on combat

Potential Mechanisms and Effect on Substance Use

Mechanism	Effect On Use
Increased Stress	Increase
Decreased Social Support	Increase
Access to Substances	Increase/Decrease
Attitudes About Use	Increase/Decrease
Level of Supervision	Increase/Decrease

Background: Substance Use and Combat Situations

- **Vietnam:** rates of narcotic use increased in Vietnam but returned to pre-Vietnam levels after rotation back to U.S. (Robins et al., 1975)
- **Gulf War:**
 - Rates of alcohol abuse higher among deployed personnel compared to counterparts (Iowa Persian Gulf Study Group, 1997)
 - Deployed personnel reported decreased alcohol use (Bray et al. 1992)
 - Increased tobacco use among deployed Naval personnel (Forgas & Meyer, 1996)

Data Source

- **Data Source:** 1995 DoD Survey of Health Related Behaviors among Military Personnel
- **Study Sample:** 15,926 respondents with complete information about deployment status during past 30 days (2,948 women and 12,978 men)

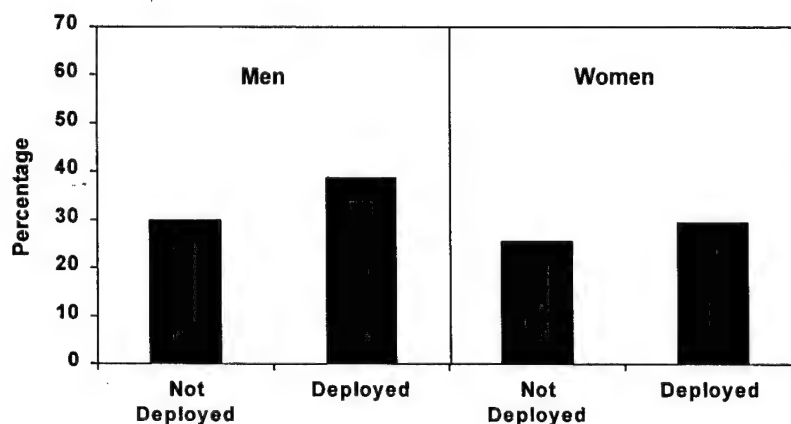
Measures

- **Deployment:** Yes/No deployed in last 30 days
 - **Illicit Drug Use:** Yes/No any use of an illicit drug (excluding steroids) during last 30 days
 - **Alcohol Use:** 3-level variable for alcohol use during past 30 days: abstainer; non-heavy drinker; heavy drinker [5+ drinks per typical drinking occasion at least once a week]
 - **Cigarette Use:** Yes/No any cigarette smoking during last 30 days
-

Statistical Methods

- **Descriptive:**
 - Examine prevalence rates of substance use by deployment status for women and men
- **Logistic and Multinomial Regression Analysis:**
 - Examine association between deployment and substance use, controlling for potential confounders

Any Cigarette Smoking Past 30 Days



Association of Deployment with Cigarette and Illicit Drug Use*

	Men		Women	
	O.R.	(95% C.I.)	O.R.	(95% C.I.)
Cigarette				
Not Deployed	1.00		1.00	
Deployed	1.30	(1.14, 1.48)	1.12	(0.86, 1.45)
Illicit Drug				
Not Deployed	1.00		1.00	
Deployed	1.24	(0.77, 2.01)	1.18	(0.38, 3.67)

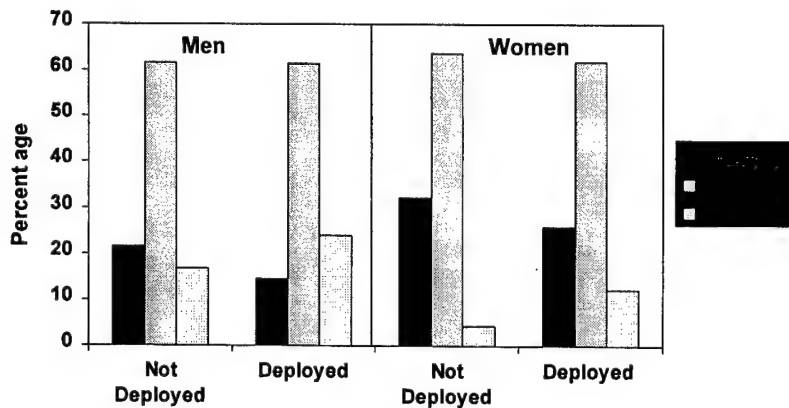
*Logistic Regression Models controlled for age, race/ethnicity, service, officer/enlisted status, marital status

Association of Deployment with Alcohol Use*

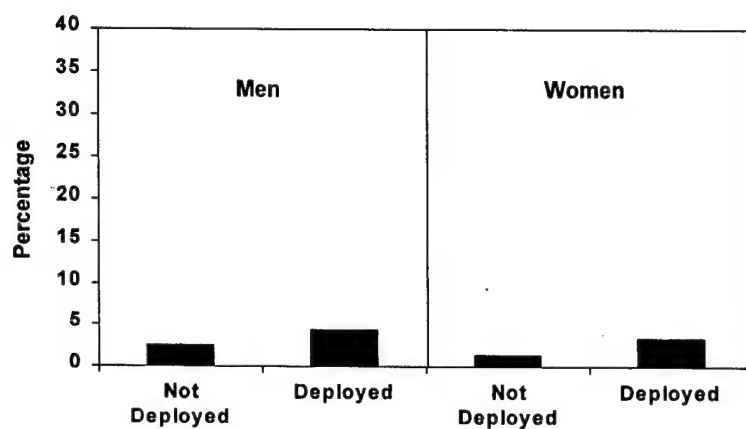
	Men		Women	
	O.R.	(95% C.I.)	O.R.	(95% C.I.)
Non-Heavy Drinker				
Not Deployed	1.00		1.00	
Deployed	1.38	(1.18, 1.61)	1.22	(0.88, 1.69)
Heavy Drinker				
Not Deployed	1.00		1.00	
Deployed	1.51	(1.23, 1.86)	2.84	(1.53, 5.28)

*Multinomial Logit Regression Models (abstainers non-disease category)
controlled for age, race/ethnicity, service, officer/enlisted status, marital status

Alcohol Use Past 30 Days



Any Illicit Drug Use in Past 30 Days



Demographic Characteristics of Study Sample

Demographic Characteristics		Males		Females	
		Not Deployed (n=9709)	Deployed (n=3269)	Not Deployed (n=2665)	Deployed (n=283)
Age	≤ 20	9.8	14.6	14.3	20.6
	21-25	29.2	37.7	31.7	37.7
	26-34	34.4	31.1	32.8	29.7
	≥ 35	26.6	16.6	21.1	12.0
Race	White	68.4	71.2	60.8	53.6
	Black	16.3	14.2	25.5	25.6
	Hispanic	8.8	8.0	7.2	13.3
	Other	6.5	6.6	6.6	7.4
Marital Status	Not Married	36.1	43.7	47.2	61.8
	Married	63.9	56.3	52.8	38.2

Demographic Characteristics of Study Sample (Continued)

Demographic Characteristics		Males		Females	
		Not Deployed (n=9709)	Deployed (n=3269)	Not Deployed (n=2665)	Deployed (n=283)
Education	≤ High School	34.2	45.9	26.4	35.4
	Some College	45.6	37.0	51.1	47.3
	≥ College	20.2	17.1	22.5	17.3
Service	Army	27.7	41.3	30.1	58.6
	Navy	26.3	35.0	26.0	26.2
	Marine Corps	11.6	12.9	4.2	3.3
	Air Force	34.4	10.8	39.7	11.9
Pay Group	Officer	83.7	85.6	82.8	87.3
	Enlisted	16.3	14.4	17.2	12.7

Conclusions

After controlling for demographic characteristics:

- **Cigarette Use:** deployment associated with use among men but not women
- **Alcohol Use:**
 - **Women:** deployment strongly associated with heavy use but not with moderate use.
 - **Men:** deployment associated with both moderate and heavy use
- **Illicit Drug Use:** no association between deployment and use for either women or men

Limitations

- Cross-sectional data
- No direct measure substance use before, during, and after deployment
- General use of term "deployment" - versus specific types of deployment (e.g. combat, peace keeping)
- Self-report data

Directions for Future Research

- Research comparing use before, during, and after deployment to examine changes in use.
- Research exploring changes in use by type of deployment.
- Qualitative and quantitative research to explore causal factors for change (e.g. impact of stress, access, supervision), including differences in causal factors between women and men.

Substance Use and Injury Among Military Women and Men

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Health Association, at Indianapolis, IN, November 13, 1997

Background

- Unintentional injury is the fourth leading cause of death in the U.S. each year, accounting for 100,000 deaths.
 - 46,000 killed in motor vehicle crashes
 - up to 11,000 die from work-related injuries
- Nonfatal injuries account for 1 in 6 hospital days and 1 in 10 hospital discharges.
 - 10 million on-the-job injuries each year, of which 3 million are severe
 - injuries disproportionately high among men, younger and older persons

Healthy People 2000 Objectives for Unintentional Injuries

- Reduce deaths caused by unintentional injuries to no more than 29.3 per 100,000 people.
- Reduce deaths caused by motor vehicle crashes to no more than 16.8 per 100,000 people.
- Reduce nonfatal unintentional injuries to no more than 754 per 100,000 people.
- Reduce work-related injuries resulting in medical treatment, lost time from work, or restricted work activity to no more than 6 cases per 100 full-time workers.

Injury Rates

■ Injuries Requiring Hospitalization:

— Healthy People 2000	754 per 100,000
— Military personnel	3,388 per 100,000
Military women	3,383 per 100,000
Military men	3,388 per 100,000

■ Work-related Injuries:

— Healthy People 2000*	6.0 per 100 workers
— Military personnel**	9.5 per 100 workers
Military women	6.5 per 100 workers
Military men	10.0 per 100 workers

*requiring treatment, lost time, or restricted activity

**any injury

Highest Rates of Hospitalization for Injury

Highest rates	Per 100,000
Ages 20 and younger	5,431
Junior enlisted (E1-E3)	4,863
High school education or less	4,412
Infantry, guncrew, seamanship specialist	6,364
Craftsman	4,605
Illicit drug user	5,540
Heavy alcohol user	4,276

No Differences

Women and men

Women and men by demographic characteristics

Highest Rates of Work-related Injury

Group		Comparison group	
Age 20 and younger	15.0%	Age 35+	5.0%
High school or less	12.3	College grad	3.4
Enlisted Personnel	10.8	Officers	2.8
Infantry, gun crew, seamanship specialist	16.3	Functional support	6.0
Craftsman	18.2		
Electrical/mechanical repairman	13.0		
Any illicit drug use	19.0	No use	8.9
Heavy alcohol use	13.4	Abstainers	8.6

Highest Rates of Work-related Injuries by Gender

Women	Percent	Men	Percent
Total	6.5	Total	10.0
Any illicit drug use	12.7	Any illicit drug use	19.7
Heavy alcohol use	11.4	Age 20 or less	16.2
High school or less	9.8	Heavy alcohol use	13.4
Ages 21-25	9.3	High school or less	12.6

Work-related Injury and Substance Use

	Women	Men
Illicit drug use		
Any use	12.7	19.7
No use	6.2	9.3
Drinking Level		
Abstainer	6.7	9.0
Infrequent/light	5.3	9.8
Moderate	6.9	9.2
Moderate/Heavy	6.0	9.0
Heavy	11.4	13.4

Significant Gender Differences in Rates of Work-related Injuries: Demographics

	Women (%)	Men (%)
Total	6.6	10.5**
Whites	5.8	10.2**
Age Group		
20 and younger	8.5	16.2**
26-34	4.7	8.9**
Marital Status		
Unmarried	6.5	11.6**
Married	6.5	9.0**
Some College	6.6	10.5**
Enlisted	7.4	11.3**

**p<.01

Significant Gender Differences in Rates of Work-related Injuries: Substance Use

	Women (%)	Men (%)
Total	6.6	10.5**
Illicit Drug Use, 12 Months		
Any use	12.7	19.7**
No use	6.2	9.3**
Drinking Levels		
Infrequent/light	5.3	9.8**
Moderate/heavy	6.0	9.0*

Note: Rates of work-related injuries among women and men who were heavy drinkers were not significantly different(11.4% and 13.4%)

*p<.05, **p<.01

Odds of Injury for Military Personnel

Age	Odds Ratio
20 and under	2.48*
21-25	1.93*
26-34	1.45*
35+	1.00
Occupation	
Craftsman	3.06*
Combat	2.33*
Electronic mechanical equipment repair	1.92*
Service and supply	1.74*
Electronic equipment repair	1.57*
Functional Support	1.00
Drug Use, past 12 months	1.68*
Drinking Level	
Heavy	1.04
Abstainer	1.00

*p<.05

Model controlled for effects of gender, race/ethnicity, education, marital status, frequency of drinking before work, frequency of drinking during lunch or breaks, frequency of eating breakfast, frequency of getting 6+ hours of sleep / night.

Conclusions

- Military rates of hospitalizations for injury are 4.5 times higher than corresponding rates in civilian population.
- Military rates of hospitalizations for injury and work-related injuries are highest among younger persons, less well educated, enlisted personnel, and substance users.
- Illicit drug use and heavy alcohol use are associated with high rates of hospitalizations for injury and work-related injury for military women and men.
- However, the relationship between heavy alcohol use and work-related injury appears to be moderated by occupation.

Does Stress Differentially Affect the Work Performance of Military Women and Men?

Findings from a Worldwide Survey of U.S. Military Personnel

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Stress: Relationship to Functional Impairment

- Stress: predictive of substance abuse problems, depression, and decreased capacity to function effectively
- Relationship between stress and functional impairment moderated by type of stressor, and by individuals' appraisal of the degree of stress associated with life events and chronic stressors
- Coping Style: can mediate the relationship between stress and functional impairment
- Military women and men subject to a wide range of stressors. Women may experience stress associated with being female in a predominantly male environment
- Preliminary analysis: military women reported somewhat higher levels of work- and family-related stress than military men

Study Purpose

- Policy debate: how to structure working lives of women and men in the armed forces? Need for empirical data on which to base policy decisions
- Examine the effect of stress on impaired functioning at work for military women and men
- Examine the association of coping style, substance use, depression, and other factors with risk for lower functioning at work for military women and men

Methods

- Multivariate cumulative logistic regression analysis
- N= 16,193 men and women in all branches of Armed Forces worldwide
 - 2,974 women
 - 13,219 men
- Anonymous self-administered questionnaires; 70% response rate
- Used SUDAAN software to account for unequal weighting, stratification and clustering of sample

Dependent Measure: Impaired Work Performance

■ Number of workdays in past year (from none to 40 or more) on which these things happened:

- was late for work by 30 minutes or more
- left work early for a reason other than errand or early holiday
- was hurt in on-the-job accident
- worked below normal level of performance
- did not come to work because of illness or accident

Independent Measures: Domains of Stress

Severity (none at all, to a great deal) of stress experienced in past year from:

● Work-related Stress

- Deployed at sea or in the field
- Permanent change of station (PCS)
- Problems in relationship with supervisor/ co-workers
- Concern about being separated from the military
- Increases in work load

● Health-related Stress

- Health problems
- Health problems in family

● Family-related Stress

- Being away from family
- Changes in family such as birth of a baby, divorce, or death in family
- Conflicts between military and family responsibilities

● Financial Stress

- Problems with money
- Problems with housing

Independent Measures

- **Symptoms of Depression** In the past year:
 - had 2 weeks or more in which felt "sad, blue, or depressed"
 - felt sad or depressed much of the time
- **Alcohol Use**
 - Abstainer Drinks once a year or less
 - Infrequent / light
 - Moderate
 - Moderate / heavy
 - Heavy Men: drinks 5+ drinks at least once a week
 Women: drinks 4+ drinks at least once a week
- **Illicit Drug Use** In the past year:
 - Any use of marijuana, PCP, LSD, cocaine, amphetamines, tranquilizers, barbiturates, heroin, analgesics, inhalants, or "designer drugs"

Independent Measures: Coping Style

Frequency (never, rarely, sometimes, frequently) of engagement in these activities when feeling "pressured, stressed, depressed, or anxious":

- | | |
|---|--|
| Positive (Approach) Coping Style | Talk to a friend or family member |
| | Exercise or play sports |
| | Think of a plan to solve the problem |
| Negative (Avoidant) Coping Style | Light up a cigarette |
| | Have a drink |
| | Use marijuana or other illegal drugs |
| | Get something to eat |
| | Thinking about hurting or killing self |

Independent Measures: Demographic Characteristics

- **Age**
 - 20 or younger
 - 21- 25
 - 26- 34
 - 35 or older
- **Race/Ethnicity**
 - White
 - Black
 - Hispanic
 - Other
- **Job Status**
 - Officer
 - Enlisted
- **Marital Status**
 - Married
 - Unmarried
- **Education Level**
 - High school diploma or less education
 - Some college or tech. school graduate
 - College graduate or post-grad. education

Risk for Lower Functioning at Work

Significant Independent Measures	Women OR (95%CI)	Men OR (95%CI)
Work-related Stress	1.3 (1.2,1.4)	1.1 (1.0,1.2)
Health-related Stress	1.3 (1.2,1.4)	1.3 (1.2,1.4)
Financial Stress	ns	1.2 (1.1,1.2)
Symptoms of Depression	1.3 (1.1,1.6)	1.3 (1.2,1.4)
Negative Coping Style	ns	1.1 (1.1,1.2)
Illicit Drug Use	ns	1.4 (1.1,1.6)
Heavy drinker vs. Abstainer	ns	1.2 (1.0, 1.4)
Heavy drinker vs. Infrequent/light	ns	1.2 (1.0, 1.4)
<= 20 vs. 35 or older	ns	1.3 (1.1, 1.5)
21-25 vs. 35 or older	1.4 (1.1,1.7)	1.3 (1.1, 1.5)
26-34 vs. 35 or older	ns	1.3 (1.1, 1.4)
Hispanic ethnicity	0.7 (0.4,0.9)	0.8 (0.7,0.9)
"Other" ethnicity	ns	0.9 (0.6, 0.9)

Main Conclusions

- Work and health-related stressors and depression increase odds of a lower level of functioning at work for women and men
- For men, in addition financial stress, heavy drinking, illicit drug use and negative coping style increase odds of lower level of functioning at work
 - In contrast, those factors not associated with lower functioning at work for women
- Overall impact of work-related stress may be somewhat greater for women (if work-related stress associated with lower job functioning, and women report a greater level of stress at work)

Implications for Policy and Further Research

- Focus on mental health interventions—depression equally affects military men and women's ability to function well on the job
- Focus on improving work environment and work relationships—a locus of stress for both women and men
- Research needed to explore how aspects of work-related stress may differ for men and women (e.g. issues of harassment or discrimination may affect women disproportionately—not addressed in this survey)

Co-Occurrence of Substance Use and Other Health-Risk Behaviors Among Military Women and Men

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Background

- A large body of research suggests that many high-risk behaviors are interrelated, some of which have long-term health consequences.
- Studies have shown relationships between smoking and other health-threatening behaviors such as drinking alcohol, using illicit drugs, using smokeless tobacco, carrying weapons, engaging in physical fights, ever having had sexual intercourse, and failure to wear seatbelts.
- However, much of this research has been conducted on youth and among the civilian population.
- Extent of generalizability of findings to active-duty military women and men is unknown, particularly under noncombat peacetime settings

Objectives of Presentation

- Examine relationship of substance use and other high-risk behaviors among military women and men
 - Substance use includes
 - Alcohol
 - Illicit drugs
 - Cigarette smoking
 - Other high-risk behaviors include
 - Inconsistent seat belt use
 - Engaging in physical fights
 - Having sex with multiple partners
-

Data Source and Sample Sizes

- 1995 DoD Worldwide Survey of Health Related Behaviors Among Military Personnel

Women	N	=	2,974
Men	N	=	13,219
Total	N	=	16,193

Definitions of Substance Use

Alcohol Use:

- Five drinking levels consisting of abstainers, infrequent/light , moderate, moderate/heavy and heavy drinkers. Consumption of 5 or more drinks per typical drinking occasion at least once a week during the past 30 days

Illicit Drug Use:

- Any use in the past 12 months of marijuana, PCP, LSD or other hallucinogens, cocaine, amphetamines or other stimulants, tranquilizers or other depressants, barbiturates or other sedatives, heroin or other opiates, analgesics or other narcotics, inhalants, or "designer drugs"

Cigarette Use:

- Nonsmoker, nonheavy smoker, heavy smoker (pack or more/day)

Definitions of Other High-Risk Behaviors

■ Number of Fights in the Past 12 Months

- 0
- 1
- 2 or more

■ Number of Sexual Partners in the Past 12 Months

- 0-1
- 2-4
- 5+

■ Level of Seat Belt Use in Past 12 Months

- Always or Nearly Always
- Sometimes, Seldom, or Never

Sociodemographic Characteristics

	Women	Men
Age		
20 and younger	15.2	11.3
21-25	32.5	31.9
26-34	32.5	33.3
35+	19.9	23.5
Race/Ethnicity		
White	59.8	68.8
Black	25.6	16.0
Hispanic	7.9	8.6
Education		
HS or less	27.6	38.1
Some college	50.7	42.9
College degree	21.6	19.0
Marital Status		
Married	51.0	61.6

Substance Use Among Women and Men

Substance Use	Women (%)	Men (%)	Total (%)
Heavy Alcohol Use, Past 30 Days	5.3	18.8	17.1
Any Illicit Drug Use, Past 12 Months	5.3	6.7	6.5
Any Cigarette Use, Past 30 Days	26.3	32.7	31.9

Source: Worldwide Survey of Health Related Behaviors Among Military Personnel: 1995

Fights, Sexual Partners, and Seat Belt Use

Behavior	Women (%)	Men (%)	Total (%)
Physical Fights, Past 12 Months			
None	95.6	88.3	89.2
1	3.4	6.3	6.0
2 or more	1.0	5.3	4.8
Number of Sexual Partners, Past 12 Months			
None or 1	71.4	69.6	69.8
2-4	23.2	20.5	20.8
5 or more	5.5	9.9	9.4
Seat Belt Use			
Always/nearly always/don't drive	95.3	89.9	90.6
Seldom/rarely/never	4.7	10.1	9.4

Source: Worldwide Survey of Health Related Behaviors Among Military Personnel: 1995

Substance Use and Number of Fights

Substance Use	Odds Ratios		
	Women	Men	Total
Drinking Levels, Past 30 Days			
Heavy	6.22*	3.24*	3.38*
Moderate heavy	2.70*	2.07*	2.13*
Moderate	2.81*	1.33	1.42*
Infrequent/light	2.05*	1.29	1.35
Abstainer	1.00	1.00	1.00
Illicit Drug Use, Past 12 Months			
Any	1.98*	1.75*	1.76*
None	1.00	1.00	1.00
Cigarette Use, Past 30 Days			
Heavy smoking	2.16*	1.69*	1.71*
Non-heavy smoking	1.20	1.14	1.14
None	1.00	1.00	1.00

*p<.05

Gender-specific models controlled for Service, race/ethnicity, marital status, enlisted/officer status, education, and age (continuous). Total model also controlled for gender.

Source: Worldwide Survey of Health Related Behaviors Among Military Personnel: 1995

Substance Use and Number of Sexual Partners

Substance Use	Odds Ratios		
	Women	Men	Total
Drinking Levels, Past 30 Days			
Heavy	3.49*	3.41*	3.51*
Moderate heavy	3.32*	2.41*	2.58*
Moderate	2.13*	1.62*	1.71*
Infrequent/light	1.99*	1.25	1.38*
Abstainer	1.00	1.00	1.00
Illicit Drug Use, Past 12 Months			
Any	1.64*	1.56*	1.58*
None	1.00	1.00	1.00
Cigarette Use, Past 30 Days			
Heavy smoking	1.48*	1.42*	1.41*
Non-heavy smoking	0.84	1.09	1.06
None	1.00	1.00	1.00

*p<.05

Gender-specific cumulative logit models controlled for Service, race/ethnicity, marital status, enlisted/officer status, education, and age (continuous). Total model also controlled for gender.

Source: Worldwide Survey of Health Related Behaviors Among Military Personnel: 1995

Substance Use and Seat Belt Use

Substance Use	Odds Ratios		
	Women	Men	Total
Drinking Levels, Past 30 Days			
Heavy	2.67	2.14*	2.17*
Moderate heavy	1.31	1.63*	1.63*
Moderate	1.71	1.27	1.31
Infrequent/light	1.06	1.17	1.16
Abstainer	1.00	1.00	1.00
Illicit Drug Use, Past 12 Months			
Any	1.89	2.23*	2.23*
None	1.00	1.00	1.00
Cigarette Use, Past 30 Days			
Heavy smoking	2.21*	1.41*	1.44*
Non-heavy smoking	1.01	0.98	0.99
None	1.00	1.00	1.00

*p<.05

Gender-specific logistic models controlled for Service, race/ethnicity, marital status, enlisted/officer status, education, and age (continuous). Total model also controlled for gender.

Source: Worldwide Survey of Health Related Behaviors Among Military Personnel: 1995

Summary and Conclusions

- Military women and men showed a strong relationship between substance use and other health-risk behaviors of getting into fights, having multiple sexual partners, and using seat belts inconsistently.
- There was a consistent pattern of results (though some were not significant) showing that those who drank greater amounts of alcohol, used illicit drugs, and were heavy smokers were more likely than their counterparts to have more fights, to have more sexual partners, and to use seat belts inconsistently.
- For military women, the risk of more fights and a greater number of sexual partners increased with any use of alcohol whereas for military men they increased only for moderate or greater use.
- Inconsistent seat belt use was not significantly associated with alcohol use or illicit drug use for military women, though it was for men.

Implications and Research Recommendations

- Relationships are correlational, but to the extent that substance use contributes to other high-risk behaviors, results suggest that
 - reducing substance use may help reduce fights number of sexual partners, and inconsistent seat belt use.
 - substance use prevention programs should emphasize the connection between substance use and other high-risk behaviors.
- More research is needed to understand better the nature of the causal relationships among high-risk behaviors faced by military men and women.

